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ABSTRACT

The third of four volumes, this report documents the implementation, evolution, and institutionalization of the Alaska Knowledge Base System, a computerized database containing information about a variety of educational resources developed by the Educational Telecommunications for Alaska (ETA) Project in response to the need for quick access to educational resource materials in Alaska. Following an overview of Alaskan educational needs, the purpose and results of the Alaska Department of Education Planning and Evaluation Survey and the Telecommunications Alternatives Survey are discussed. The development and evaluation of the computer-supported Alaska Knowledge Base System is then recounted, with discussions of Alaska Knowledge Base content, the technological component of the Knowledge Base, the Knowledge Base Cost Study (including a breakdown of computer system alternatives), program planning and implementation, user specifications in software development, the pre-operational Knowledge Base network configuration, the operational support network, pilot test evaluation, and the operation of the Knowledge Base retrieval system. The status of Knowledge Base data files is also discussed. Appended to the text are a list of planning objectives and examples of Knowledge Base data file printouts. A list of abbreviations and a bibliography on the Knowledge Base are also included. (JL)

EDUCATIONAL TELECOMMUNICATIONS FOR ALASKA

VOLUME III

ALASKA KNOWLEDGE BASE SYSTEM

Prepared for:

National Institute of Education
1200 Nineteenth Street, N.W.
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By:

Office of Educational Technology
and Telecommunications
Alaska Department of Education
Pouch F
Juneau, Alaska 99811

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YAF ASSOCIATES 6512 WINDERMERE CIRCLE ROCKVILLE, MARYLAND 20852

The foundation of every state is the education of its youth.

Dionysius

FOREWORD

It was with considerable excitement and some trepidation that the Department of Education undertook the Educational Telecommunications for Alaska Project in 1977. The Project was viewed with excitement since technology appeared to offer great potential for solving some very difficult problems facing public education in the State. It was viewed with some anxiety because the solutions posed involved complicated and relatively untried technologies which presented educators with strategies that were in part unfamiliar and mysterious.

No other state education agencies were investing such a large amount of funding in what some regarded as a very risky venture in modern technology. However, the State took the position that the Project offered possible solutions to educational problems where no alternative solutions were known to exist. It was regarded as a capital investment that could pay large dividends for years to come. The systems developed by the Project were to be thoroughly evaluated. Only those that were judged to be successful and to hold long-term potential for improving education in the State were to be maintained beyond the term of the Project.

In retrospect it is interesting that there was such a high degree of caution at the onset of the Project. The systems developed by the Project are now an integral part of the educational delivery system in the State. They are used by a wide variety of educators --State and local administrators, teachers, local support staffs, and, most importantly, students in many, many communities.

The Project was designed to address three basic needs. These were as follows:

- The need for faster, more efficient communication in support of the administration of schools in the State.
- The need for quick access to information about educational resources.
- The need for instructional support for rural high school students.

Three systems were designed to address these needs:

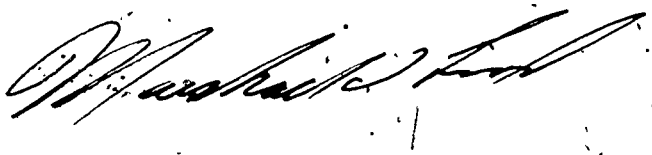
- An administrative communication network (electronic mail system) that interconnects the Department of Education with the 52 local school districts and other educational agencies in the State.
- A computerized "Alaska Knowledge Base" containing information about a variety of educational resources and accessible via the electronic mail system.
- A microcomputer-based method for providing instruction to rural high school students and a set of core courses for ninth and tenth graders.

Today much of the time-critical written communication associated with the statewide administration and support of local school districts is transmitted via the Administrative Communications Network. Teachers and administrators regularly consult the Alaska Knowledge Base to locate educational resources to apply to problems they encounter. Virtually all school districts in the State utilize microcomputers for a portion of their instructional program and students in small rural high schools have available to them a greater variety of high school courses because of the Project.

The Project has had a major impact on the nature of education in the State. In fact, largely through the impetus provided by the Educational Telecommunications for Alaska Project, Alaska is regarded as a leading state in the application of educational technology. The Department is very pleased to have received the support provided by the National Institute of Education and the State of Alaska. We anticipate continued work in educational technology in the years to come.

Successful institutionalization of the Educational Telecommunications for Alaska Project is documented in a set of four final reports; one covering each of the three educational systems and an Executive Summary. This volume contains one of those reports.

In fulfillment of its commitment to the National Institute of Education, this set of documents is submitted in the sincere hope that the reports will also provide insights and information useful to others in their efforts to improve the quality of public education in the future.



MARSHALL LIND
Commissioner
Alaska Department of Education

ACKNOWLEDGEMENTS

The Educational Telecommunications for Alaska (ETA) Project has effected a number of significant changes in educational administration and instruction in Alaska. These changes represent improvements in the quality of public education in the State. The Project involved highly complex applications of modern technology to identified educational needs. However, the complexity of coordinating the efforts of many individuals and groups was by far the most difficult problem addressed by the Project. The success of this Project was due, therefore, to the contributions and willingness to cooperate on the part of a large number of persons.

Throughout the term of the Project the support of the State Board of Education, the Governor's Office, the Alaska Legislature, and the National Institute of Education has been paramount. Without this support and the endorsement of the Commissioner of Education, Marshall Lind, the Project would not have been possible.

The design of the Project was developed in 1976-1977 by a team of individuals led by Ernest Polley, then Coordinator of Planning and Research for the Department of Education. Polley's continued support during the term of this Project was essential.

The Educational Telecommunications for Alaska Project was managed by a core staff of Alaska Department of Education personnel. The staff were located first in the office of Planning and Research and later in a new Office of Educational Technology and Telecommunications which came into being largely as an outcome of the Project. The ETA Project director in DOE was William Bramble who in July, 1981, became director of the Office of Educational Technology and Telecommunications. Ed Obie served as assistant Project director until July, 1981, when he was appointed Project director for the remainder of the Project term. Professional staff at DOE assigned to the ETA Project included Paul Berg, Rosemary Hagevig, and Bee Tindell. Other individuals in DOE who contributed to the overall success of various components of the Project included Alexander Hazelton, Eula Ruby, Sandra Berry, and Dan Boone.

Assistance in the development of the Project design was provided by the Northwest Regional Educational Laboratory (NWREL). Upon approval of the initial grant award from NIE in September, 1977, and, with the commitment of NIE and the Alaska Legislature to support the multi-year effort, NWREL became the Design and Implementation Contractor for the Project. NWREL designed, developed, and pilot-tested the major technological systems included in the Project. In addition, NWREL produced the computer-based courseware for rural high schools. The overall NWREL effort was administered by Tom Olson and, later, Ethel Simon-McWilliams. NWREL staff who contributed to basic systems design and development included Judy Edwards, Hal Wilson, Stuart Brown, and Ralph Van Dusseldorp. Ann Murphy, Kathy Busick, Craig Copley and many others from NWREL contributed to the development of computer-based courseware.

Key support for the installation of the data communications network was provided by two other State agencies. The Division of Data Processing, Department of Administration, provided for the procurement, installation, and operation of data processing elements required for the electronic mail system and educational data bases developed by the Project. The contributions of David Riccio and Stan Hamlin were critical in this regard. The data communications network established for this system was implemented by the Division of Communications, Department

of Transportation and Public Facilities, with considerable input from Walt Pierce of that agency.

Two intermediate education agencies performed important functions related to pilot testing and implementing the systems developed by the Project. These were the South East Regional Resource Center in Juneau and the South Central Regional Resource Center in Anchorage. The contributions of Alan Barnes, Luanne Packer, Linnel McCrumb, and Jane Harrington were especially noteworthy.

Other individuals or agencies contracting to DOE or related State agencies made substantial contributions to the success of the Project. Transalaska Data Systems installed and maintained microcomputers at sixty locations in the State. Karen Parr developed instructional materials and provided training for the computer-based education courses developed by the Project. Glenn Cowan and Janelle Cowan contributed additional training and support for these courses. Computer programming support was provided to the Department by Mike Noel and Charles Dockery. The evaluation of the computer-based instruction courses was conducted by Education Skills Development of Lexington, Kentucky, with contributions from Emanuel Mason, Timothy Smith, and Frank Gohs.

Extremely important to the success of the systems and the particular products developed by the Project were the many contributions of administrators, teachers, and other staff of local school districts in Alaska. These individuals served to keep the Project on track in design and development through participation on numerous design and advisory teams that existed during all phases of the Project. Additional individuals too numerous to include assisted with pilot testing and implementation of the Project components. By the conclusion of the Project every one of the 52 school districts in Alaska had participated. Noteworthy too was the involvement of several hundred students in Alaska schools who participated in pilot tests of instructional materials. Students in public schools, of course, are the ultimate beneficiaries of the Project. It is fitting, therefore, that the participation of these students should result in educational gains for all the children of Alaska for years to come.

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PREFACE

The Educational Telecommunications for Alaska Project addresses the needs of three distinct user groups: superintendents/ administrators, school staffs, and students. As such, there are three tracks that at times coincide but, in the main, follow their own evolutionary course. Thus, each of the components, Administrative Communications Network, Alaska Knowledge Base System, and Individualized Study by Telecommunications, has been developed as a stand-alone volume for those who are particularly interested in one but perhaps not the other components. The Executive Summary ties the entire Project together by providing an overview of all components.

Included in each volume is a historical perspective detailing Alaska's prior experience with satellite technology and the Alaskan educational and geographic contexts -- all of which shaped the Project as it was proposed to the National Institute of Education in 1977. Without this perspective, a great deal of understanding of the driving forces involved would be lost. Thus, the reader will find that several introductory sections are repeated in each volume.

HISTORY OF ALASKAN INVOLVEMENT WITH SATELLITE COMMUNICATIONS

The Educational Telecommunications for Alaska (ETA) Project is the result of years of planning and experimentation with communication satellites by the State of Alaska. The first cautious probings were conducted with the National Aeronautics and Space Administration's (NASA) Advanced Technology Satellites, ATS-1 and 6, beginning in 1970 and continuing through 1975. The experiments included both voice and full-motion video for education, in support of health care, and for reaching out to all people with a need for information that affected their lives. Experimentation with the new technology was driven by the necessity to provide a large variety of services to all Alaskans, whether they lived in cities or in the most isolated areas. These tentative explorations demonstrated to the State that communication satellites were an essential element in meeting future needs for education and other public services.

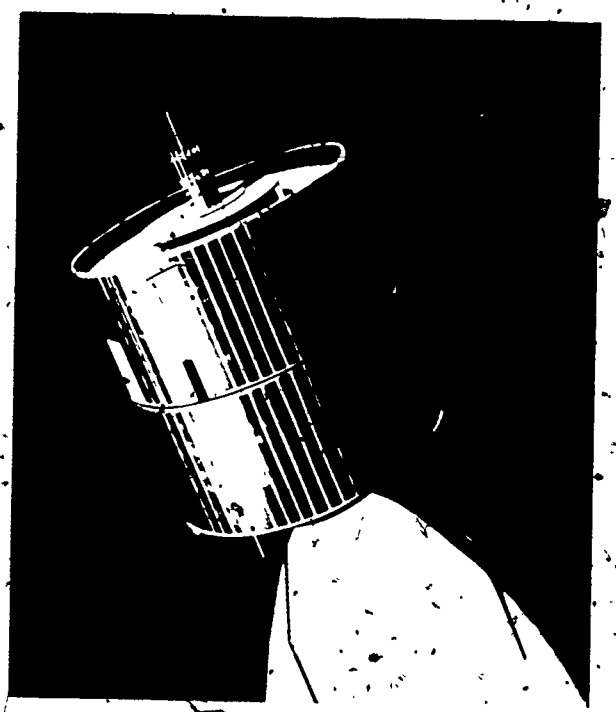
The process began in 1968 with the establishment of a Satellite Task Force whose objective was to determine the total requirements for all communications services existing and projected.

In late 1969, a formal proposal was submitted to NASA for two-way audio experimentation on the ATS-1 satellite. The first demonstrations began in 1970, transmitting public radio programming between KUAC in Fairbanks and stations in the lower 48 states.

A joint United Nations Educational, Scientific and Cultural Organization (UNESCO)-Alaska National Education Association (NEA) team in 1970 investigated the feasibility of using satellites to alleviate educational problems of the State. The team concluded, in part, "Satellite communications for Alaska, as part of an overall long-range educational communications system, are not only feasible, but necessary for improved communications in the State."

In mid-1971 an Alaska Educational Telecommunications Consortium (AETC) was created to guide ATS-1 projects (two-way voice) and to identify technical solutions to help solve rural educational problems. Over the succeeding two years, more than 25 villages with no existing telephone or television service were involved in the interactive project. Programming was varied, ranging from health-aide training to Native legends; teacher, administrator, and classroom exchanges; and direct village contact with library services. As with many innovative approaches, this project was initially plagued with many problems involving technical factors and frequent schedule changes. The weakest link, however, was the lack of direct teacher involvement in designing programs for classroom use. The most successful

applications were in villages where someone, usually a teacher, took responsibility for involving the community. The study concluded that experiments should continue with more emphasis on evaluation of impact between participating schools and non-satellite schools.



Educational experimentation became very infrequent but continued through 1975. Emphasis during this period shifted to detailed studies of educational needs. The Teleconsult study, submitted to the Department of Health, Education and Welfare (DHEW) and NASA, included exploration of persistent educational needs, suggestions of specific programming areas, and establishment of priorities to meet those needs. The focus remained on audio and visual materials distributed via a variety of means, including commercial satellites. Priority programming areas included Native culture, bilingual news programs, and on-going teacher in-service training.

In 1972, the Alaska Educational Broadcasting Commission (AEBC) submitted to the U.S. DHEW "A Proposal to Develop a Plan for Alaska's Unique and Innovative Education Demonstration Employing ATS-F." (The letter designator is assigned to NASA experimental satellites prior to launch; in orbit the satellite became ATS-6.) This satellite, the most powerful ever to be launched at that time, could relay video as well as audio to small, inexpensive earth stations. The proposal was subsequently funded.

While attention focused on satellite-supported educational needs experimentation, an Executive Order created the Office of Telecommunications (OT) within the Governor's Office in 1973. OT was created to provide the State with a focal point for communications

policy development and to ensure adequate development of cost-effective communications techniques to serve all State residents. In March of that year, OT assumed responsibility for Alaska's ATS-F Demonstration Plan. In August, 1973, Federal supervision of the national educational ATS-F demonstration program, the Education Satellite Communication Demonstration (ESCD), became the responsibility of the National Institute of Education (NIE). Planning objectives for the Alaskan educational portion of the ATS-F demonstration were:

- to gain operational experience with communication satellites;
- to apply the experience gained on ATS-1 and to extend that experience so that the users themselves would generate service requirements. (It was felt that it was better to obtain knowledge through experience before planning was completed rather than after a system was installed.)

From the earliest planning stage, close cooperation between OT and the Alaska Department of Education (DOE) resulted in project focus on two instructional concerns: first, the desire to establish two-way communications between participating educators that approximated face-to-face communications as closely as possible; and, second, the opportunity for "hands-on" experience with live video/audio communication, by a variety of users, to be utilized to make sound planning decisions.

In 1974, with a portion of the funding received from NIE, 15 communities whose average population was less than 250, were equipped with small satellite earth stations. Consumer committees were formed from persons nominated by the participating villages and Native regional corporations. They met regularly and were responsible for input to and approval of all program designs. Programs in health education and language development were designed and produced. Each program included teacher manuals and was followed on-air with an interaction session as well as on-camera teachers to reinforce the lessons. Teacher in-service training, coordinated and developed by DOE, was broadcast weekly.

Other aspects of the $1.7 million project resulted in 100 hours of original television programming being designed, produced, and broadcast. Instructional programs were made available to 1,200 K-5th Grade rural school children and 150 rural educators. Additional programming was accessible to 9,000 Alaskan village residents, young and old, as well as thousands of students in Fairbanks. At the end of one year the Demonstration came to an end. ATS-6 was moved in its orbit out of sight of Alaskan earth stations and toward India for their use. However, the results of the NIE-sponsored evaluation of ESCD had a strong influence on the direction that the ETA Project would eventually take. Key recommendations were:

- Undertake telecommunications demonstrations in rural Alaska only when there are resources and commitment for putting aspects of the demonstrations which users deem successful directly into operation.
- Undertake satellite television operations only when they can be justified on the basis of cost-effective, timely access to programming.
- Use audio interaction without video programming as soon as there is satellite telephone.
- Decide separately commitment to broadcast material and commitment of resources to new programming. The commitment to new programming must be preceded by a survey of available programming.
- Take as the mandate for telecommunications in rural Alaska: solution to the "high school problem." Three alternatives for augmenting the village high school curriculum are: materials distribution of already existing programming; teacher-sharing via audio presentations and supervised interaction; and new programming on Alaska Native history.

The momemtum generated by the ATS-6 experiments convinced Alaska educators and OT to make an in-depth assessment of an operational communications-supported system to meet the identified needs of Alaskan education. The result was a planning grant application submitted to NIE in March, 1975 the goal of which was a cost-effective model for technological application integrated with educational needs. The grant was received from NIE in November, 1975.

It was at this juncture that the Alaska DOE accepted lead responsibility for the planning grant and future activities growing out of it.

Concurrently, commercial satellite technology was emerging as a viable means for meeting Alaska's telecommunications needs. In 1975, the State and RCA Alascom (the Alaska communications carrier) reworked RCA's original plan for facilities and services to serve Alaska through 1980. The State Legislature appropriated $5 million to procure 100 small (15-foot) earth stations for rural communities and, in July of that year, it was agreed that Alascom would install and operate them. In early 1976, RCA launched its second satellite (F-2) which would carry Alaska's long-distance intra- and interstate traffic.

By early 1976, therefore, an excellent base had been established from which to launch an earnest assault on the problems that had continually plagued rural Alaskan educators: the DOE had practical experience with the techniques associated with telecommunications-supported education; OT had hands-on experience with satellite telecommunications hardware and operations; rural Alaskan villages had participated in "learning at a distance" and were supportive of further experimentation; and RCA Alascom was beginning to install rural earth stations subsequent to the launching of F-2.

In 1976, decentralization of rural education through disbanding the Alaska State-Operated School System (ASOSS) gave a sense of urgency to DOE's plans to implement innovative and cost-effective means for educating all Alaskan children. Dissolution of ASOSS resulted in the creation of 21 new rural school districts with elected local school boards and community advisory committees. Supervisory fragmentation, so long a fact of educational life in Alaska, was ending, and DOE became the key administrative and technical assistance office to support the State's 52 separate school districts.

In May, 1976, the sense of urgency was further heightened when the State Board of Education adopted new regulations that stated that school districts must provide an elementary school in each community which had eight or more children available to attend and, unless the local school committee requested otherwise, must establish a secondary school in every community with one or more available secondary students. The implications of this ruling were staggering --the DOE was required to provide a full and meaningful educational experience for students where they lived. To do so by conventional means could not be economically supported, even if there were a sufficient number of qualified teachers. It was imperative that new and innovative mechanisms be explored to provide quality education to rural Alaska.

A DOE-led task force began preparation of a proposal in July, 1976, to be submitted to NIE. It was made possible by an $85,000 grant from the Alaska Legislature. The essential outcome of the proposed effort was to be an operational, user-supported system. The intensive

planning effort by the DOE task force was to develop two major documents: (1) a determination of needs, and (2) an analysis of technical alternatives to meet the specifically defined needs. The participants included:

- *DOE* - responsible for management and development of the overall proposal and determination of needs;
- *Design Team* - a working group responsible for providing design parameters, direction, and pertinent information to the design subcontractor;
- *User's Group* - a representative group of Alaskan educators responsible for reacting to the proposal as it was developed and for paying particular attention to consumer control mechanisms;
- *Proposal Development Contractor (Northwest Regional Educational Laboratory)* - responsible for producing the required drafts of the proposal.

Based on this intensive effort, the proposal that initiated this Project, entitled, "Educational Telecommunications for Alaska," was prepared and submitted to NIE in January, 1977.

THE CONTEXT OF EDUCATIONAL NEEDS

The Educational Telecommunications for Alaska (ETA) model has been shaped by identified needs. The needs themselves were the result of the Alaskan environment and the philosophy of the Alaska Department of Education. An understanding of the background and context in which the Project functions is essential to understanding the value of ETA itself. The following narrative has been adapted from two DOE documents: "Educational Telecommunications for Alaska Project Proposal," January, 1977; and "Operational Plan Educational Telecommunications for Alaska Project," 1979.

DEMOGRAPHIC CONTEXT

Alaska is the largest state yet contains the smallest total population. More than 280 communities are widely scattered over 586,412 square miles (16 percent of the total area of the United States). The population in 1977 was estimated to be 411,211 (less than 0.5 percent of that of the United States).

Population density statewide is less than one person per square mile with 60 percent of the inhabitants living in or near three cities (Anchorage, Fairbanks, and Juneau) that are in boroughs that contain 2 percent of the State's total land. An adjusted density ratio indicates that outside these three urban areas, the density approaches one person per four square miles.

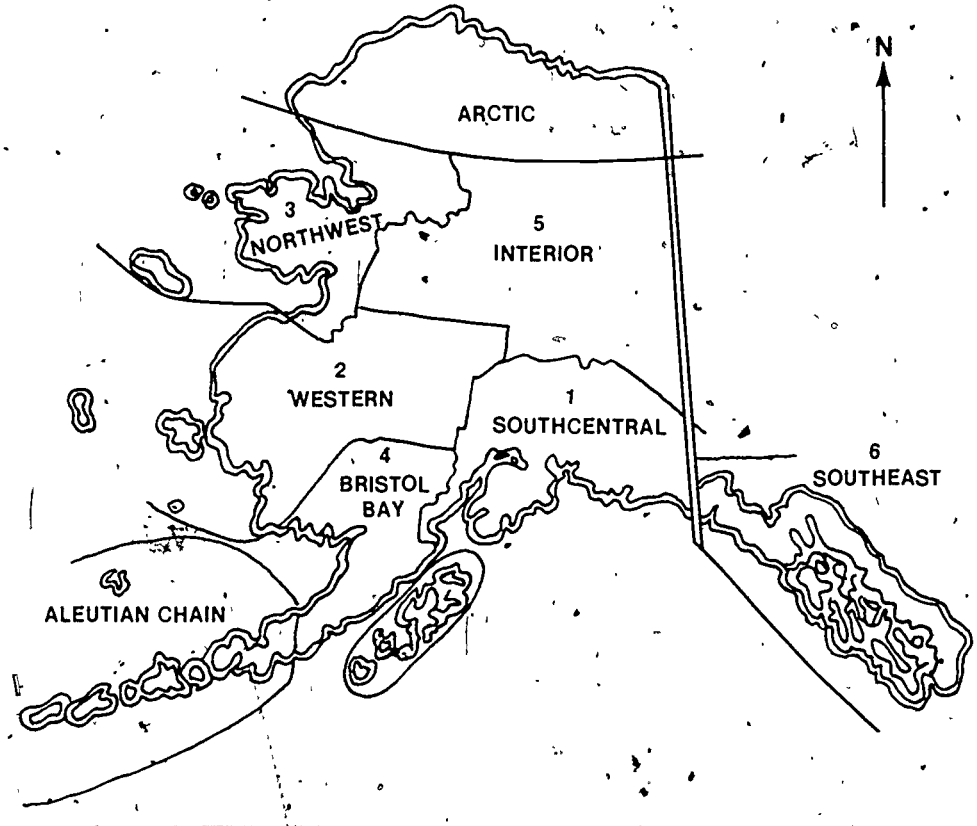
The State is regionally divided as shown in Figure 1. The most populated region is Southcentral, which includes the largest community, Anchorage. Forty-four percent of all Alaskans live within the Anchorage Borough. The Interior region ranks second with 21 percent. The population of this region is reduced to only 7 percent of the State's total when the second largest city, Fairbanks, is excluded. The Aleutian Chain and Kodiak together contain 5 percent of the population. One-third of all Southeasterners live in the State's third largest city, Juneau, the capital. The remainder of the State's people live in 150 communities (ranging in number from fewer than 25 to more than 5,000) distributed throughout the Southeast, Western coastal and Interior areas, and Arctic North.

About one-sixth of the inhabitants are Eskimo, Indian or Aleut. The major cultural groups are Inupiat Eskimo in the Arctic and Northwest; Yupik Eskimo in the Western and Bristol Bay region; Aleuts in the Aleutian Chain and Kodiak; Athapascan Indians in the Interior; and Tlingit, Haida, and Tsimshian Indians in the Southeast. Alaska has six

major languages other than English, with more than 50 significantly different dialects.

Figure 1

ALASKAN REGIONS



The total population has grown more than 34 percent since the census count in 1970, due mainly to heavy migration related to pipeline and construction-industry activity. Since total school enrollment during the 1975-76 period increased only 18.5 percent over the 1969-70 period, it is concluded that the population growth due to pipeline activity has not impacted on the vast majority of the schools in the State.

GEOGRAPHIC CONTEXT

Forty percent of all Alaskans, and 60 percent of all schools, are located in communities of fewer than 1,000 people. Isolation is often a fact of life, frequently by choice. The major factors contributing to isolation are geography, weather, the distances between communities --factors that create consistent problems in providing educational services and support.

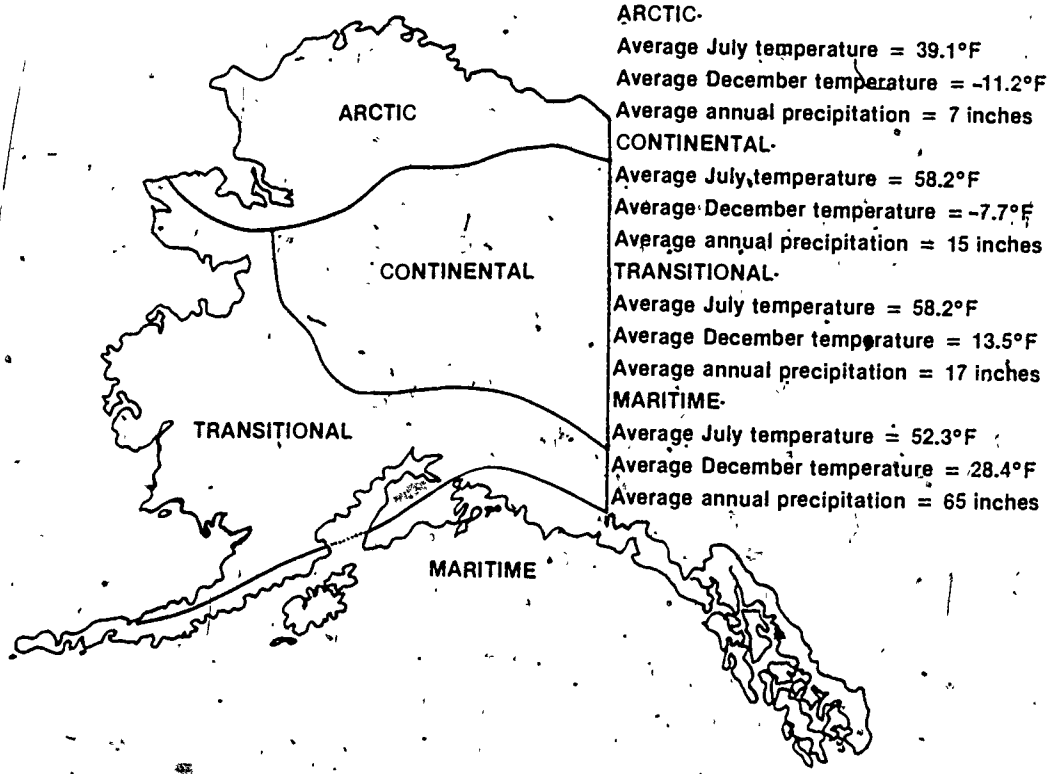
Alaska's terrain can be visually dazzling while posing formidable barriers. The fjords of Southeast and the Alaska Range in Southcentral are continuations of the coastal ranges in the northwest United States. The broad valleys and basins of the Interior are an extension of the desert plains between the Rockies and coastal mountains. The Rockies extend into the Brooks Range in northern Alaska. The Arctic coastal plain north of the Brooks is flat tundra with thousands of shallow lakes.

The State's mountains contain half the world's glaciers, with 19 peaks of more than 14,000 feet. One-third of the State is north of the Arctic Circle. Throughout Alaska there are more than three million lakes larger than 20 acres, and 10 rivers more than 300 miles long.

The climates imposed by this topography create a diversity of environments (Figure 2). Fierce, long winters have nights 24 hours long. The 2,000-mile Aleutian Chain is wet, foggy, cold, and frequently windy, year-round. Temperatures in the Interior region vary drastically from winter to summer (−50 degrees F. to +90 degrees F.). The most temperate region is Southeast, where the warming Japanese Current meets cool mountain air and results in more than 100 inches of precipitation a year in some areas.

Figure 2

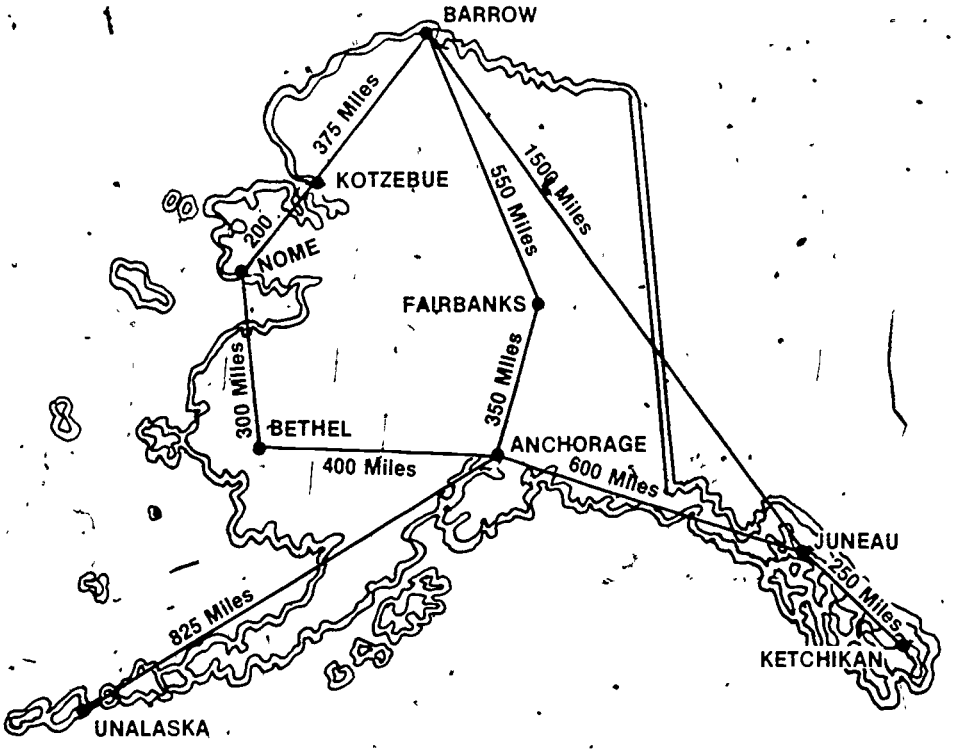
CLIMATE ZONES IN ALASKA



Distances in Alaska are vast (Figure 3). From its west to east coasts, Alaska stretches the distance from California to Florida. The northernmost community, Point Barrow, is 1,500 miles from the southernmost city, Ketchikan; Point Barrow is as far from Fairbanks as Milwaukee is from Kansas City; Bethel is 400 miles west of Anchorage approximately the same distance as San Francisco is from Los Angeles. These great distances contribute substantially to a sense of isolation and remoteness. The extremes of winter weather limit activity and contribute to Alaska's high alcoholism rate and in other ways adversely impact daily life.

Figure 3

DISTANCES BETWEEN SELECT CITIES



The effects of this isolation can be felt by Alaska's rural teachers, many of whom are not indigenous to the State. One teachers' group in a small, rural district negotiates into all contracts a yearly trip to Anchorage for an annual teachers' conference, and considers the expense a worthwhile investment in mental health and needed professional contacts not available in the village.

ECONOMIC CONTEXT

The environment and the variables in resources and industry make employment highly seasonal. Many industries -- construction, fishing,

logging -- are not active in the winter, when the weather makes outdoor work and travel difficult, if not impossible. Depending on the time of the year, region, and industry, unemployment rates fluctuate by a factor of three. State and Federal unemployment insurance payments for December through March may be double, even triple, the claims paid in June through August.

Many isolated, rural areas with rather depressed incomes still rely to some extent on subsistence hunting and fishing. While health, education, and other services are more readily available in large Native villages, subsistence hunters must compete for fewer available resources. The situation is succinctly described by the following passages from "2 (c) Report: Federal Programs and Alaska Natives."

> ". . . In recent years it has become apparent that all rural Alaska villages are in an economic trap because of the transition from subsistence to cash. They are unable to return to a complete subsistence life, nor are they able to earn enough cash to buy food, supplies, and services required to live comfortably in the larger communities.
>
> "Despite this, subsistence hunting, fishing, and gathering still play a critical part in the lives of rural villagers. Of roughly 150 Native villages of less than 300 people, subsistence activity is estimated to provide at least half of the daily calorie intake.
>
> "Temporary, seasonal employment may be available to provide some income, but also takes men away from the villages at times when subsistence foods can be most easily obtained. The available cash usually goes for materials and equipment that are vital necessities today in subsistence activities: rifles and ammunition, snow machines and outboard engines, and gasoline.
>
> "As subsistence life becomes more expensive and difficult, people must increasingly depend on store-bought groceries and goods. Young people returning to the village from boarding schools who have not learned the subsistence skills must live more and more in the cash economy."

The establishment of schools in some areas of the State has been a major contributor to the growth of larger, stable, primarily Native communities. The highly nomadic Eskimos in the Brooks Range established the permanent village of Anaktuvuk Pass because of the requirement that children attend school nine months of the year. The establishment of more permanent residences has generated the need for services suited to community living. As a result, electrical power became a necessity for village residents. Virtually all schools in the State have electricity, supplied either by local utilities, school or Federally-owned generators, or the Alaskan Village Electric Co-op (AVEC). In some villages, the construction of a one- or t[illegible]m school was accompanied by the introduction of the first gen[illegible]

TRANSPORTATION CONTEXT

Power, fuel, and other goods and services are very costly because of the limited market and because of transportation costs. Whether by road, water, rail or air, the cost of travel and freight delivery is high.

In 1970, Alaska had 7,000 miles of road, only 3,000 of which were paved. There has been no significant increase in roads since. It is interesting to compare access in Alaska with several other sparsely populated Western states.

State	Acres of Land Per Mile of Road
Alaska	52,212
Arizona	2,203
Montana	1,295
Wyoming	891

Alaska may well have more communities and schools that are not on any road system than the rest of the States combined. More than 150 rural schools are not on any connecting road system at all. The primary road network links Anchorage, Fairbanks, and Haines with connections to the Kenai Peninsula, Valdez, and many of the smaller communities in-between. But even this land link is lost for many villages in the winter when many arterial roads are not maintained and are therefore impassable.

Alaska's railroad network is even more limited. The 540-mile Alaska Railroad links Whittier, Anchorage, and Fairbanks, running daily in the summer and twice weekly in the winter. In southeast Alaska, a 110-mile narrow-gauge railroad runs from Skagway to Whitehorse in Canada's Yukon Territory.

Goods are delivered to Southeast, Southcentral, and the Interior by a combination of sea, truck, and rail. Commercial freighters and barges travel regularly between the lower 48 states, Anchorage, and some larger coastal communities. State-operated ferries carry passengers and freight among principal communities in Southeast and among communities on Prince Williams Sound, Cook Inlet, and Kodiak Island. Occasional service is provided to villages on the larger rivers by commercial freight boats. Usually an entire winter's supply of goods, ordered six months previously, is delivered in the fall.

Travel by air in Alaska is disproportionately heavy; in many areas there is no other means of transportation. Alaska ranks first in the nation in number of private pilots and planes, and in passengers and cargo tonnage flown annually. Anchorage and Fairbanks are served by several international carriers; five carriers serve most regions of the State on a regularly scheduled basis. There are numerous smaller lines,

flying to virtually every village on schedule (weather permitting) or by charter. Freight to "bush" villages (meaning, generally, those inaccessible by road) is commonly delivered by small twin-engine planes in the winter, but the costs are very high.

Air travel, although the most widely used means of transportation, can be very expensive as well as time-consuming. For example, the 1,500-mile trip from Ketchikan to Point Barrow requires four stops, two changes of airlines, and takes nine hours. A comparable 1,500-mile journey between Boston and Miami is non-stop and takes less than three hours.

The difficulties and costs of travel plague Alaskan educators continually. For instance, Atka's representative on the regional school district board was chosen to represent the board at a statewide conference to be held in Juneau in June, 1976. The school board member left on a tug for the 100-mile, six-hour trip to Adak, then chartered an eight-seat, twin-engine aircraft for the 600-mile flight from Adak to Cold Bay. From Cold Bay, she then flew to Anchorage by commercial prop-jet, spent the night in Anchorage, and made connections with a commercial jet flight to Juneau the following morning. The 1,760-mile trip to Juneau took approximately 30 hours and cost $2,600, one-way (1976 dollars)!

COMMUNICATIONS CONTEXT

The geographic barriers, environment, and vast distances that contribute to isolation and the high cost of goods and transportation,

have also contributed to Alaska's lack of extensive communications networks, especially in rural areas.

MAIL SERVICE

Virtually every community with a stable, year-round population (and every community with a school) has a post office and mail service. In smaller communities, deliveries may be only weekly or even monthly, almost always by small plane and barge.

Mail service has been the most relied upon means of statewide communication among educators. But weather is a major cause of unreliable bush service; if the river is freezing, or a storm hits, the mail plane cannot land. It has not been uncommon for a rural administrator or teacher to receive a request for information or notice of a meeting requesting a response, with the response due two days before the notice was received and three weeks after the notice was mailed.

TELEPHONE

In 1971, RCA purchased the Department of Defense-operated Alaska Communication System (ACS) consisting of terrestrial links in the Interior and Southcentral regions. A subsidiary corporation, RCA Alascom, was then established as Alaska's commercial long-lines carrier. RCA Alascom also began leasing portions of the U.S. Air Force-operated White Alice Communications System (WACS), using the combination of microwave troposcatter, landline, and marine cable links to provide long-line communication to some areas of the State not otherwise served. In 1973, RCA Alascom provided the first interim satellite links with landlines and microwave circuits through leased channels on the Canadian satellite Anik II, with a transfer to Western Union's Westar II two years later.

COMMERCIAL AND PUBLIC RADIO AND TELEVISION

An estimated 95 percent of all Alaskans can receive at least one radio broadcasting station. Nearly a dozen radio stations are publicly owned, operating under the auspices of the Alaska Public Broadcasting Commission (APBC) with the DOE. In 1978, a private non-profit corporation was established to interconnect all existing public stations in sharing local and national programming, legislative news, and other public affairs programming.

Some type of television service is also available to approximately 95 percent of the State's population. There are seven commercial television broadcast stations serving Anchorage, Fairbanks, Juneau, and Sitka and providing direct or translator reception to approximately 60 other communities. The State has leased a full transponder on RCA's F-II satellite to meet commercial broadcasting needs in Alaska. Satellite transmissions originating in Pennsylvania and California are received in Anchorage and Juneau for real-time broadcasting or for taping and delayed broadcast. Real-time broadcasting needs in other Alaskan cities are met through a terrestrial translator system connected to Anchorage or Juneau. The APBC receiving earth station in Anchorage tapes the interstate satellite transmissions, and re-broadcasts to non-commercial stations in the State. APBC then submits a video cassette of its programming to a State-contracted

facility which dubs the cassettes and distributes them through the mail to mini-TV stations throughout Alaska.

The DOE, through its Instructional TV (ITV) Project, has used satellite time not used for affiliate and bush entertainment feeds to provide instructional television to a number of village sites. As a result of modifications of select receive-only earth stations through the Satellite Demonstration Project, sponsored by the Governor's Office of Telecommunications, instructional television has become available to a larger number of communities. This is accomplished by using a 10-watt broadcast transmitter to serve each community equipped with the earth station. A number of communities have cable television offering programs taped in Seattle and circulated throughout the State in distinct separate distribution loops. Programs are delayed from one to five weeks, and the cost of cable services ranges from $18.00 to $50.00 per month.

EDUCATIONAL CONTEXT

ELEMENTARY AND SECONDARY PUBLIC SCHOOLS

In 1978, 241 Alaskan communities had at least one school. Thirty-five percent of all schools were located within the Southcentral region and served 57 percent of all enrolled students. The Interior region contained 18 percent of all schools and students. Southeast had a substantial number of smaller "urban" communities in addition to scattered rural communities. This region contained 15 percent of the schools and 13.5 percent of the State's students. The remaining regions were primarily rural, with small school enrollments. The Western region contained 4.5 percent of total enrollment and 11 percent of the schools, followed by Northwest with 3 percent of the students and 8 percent of the schools. Bristol Bay had 2 percent of total enrollment, 7 percent of the schools.

Sixty-one percent of all elementary schools and 71 percent of all secondary schools have enrollments of fewer than 100. Of these secondary schools, 46 percent have fewer than 50 students and 36 percent have 10 or fewer.

LIBRARIES

There are approximately 300 public, school, university, and special libraries in Alaska. The State Library, within DOE, coordinates statewide services and assists individuals who lack access to a local library.

Mail service is the usual means of materials distribution and inter-Library communication. The State Library provides direct assistance and/or training to librarians and circulates close to 100,000 items by mail each year to community libraries, schools, other institutions, and individuals.

The Alaska Health Sciences Information Center services requests for information by health sciences personnel statewide. The Center

operates from the University of Alaska Library in Anchorage and provides Medline computer searches of the National Library of Medicine holdings.

Material searches are facilitated by an extensive inter-library loan network. Telex and, more recently, the EMS link major facilities in Juneau (EMS), public libraries in Anchorage (EMS) and Fairbanks, the University of Alaska libraries in both cities, and the Pacific Northwest Bibliographic Center at the University of Washington, Seattle. Service requests from outside these centers are sent to Juneau, Anchorage, or Fairbanks.

The Juneau State Library facility also contains the Educational Resources Information Center (ERIC) microfiche data bank (ED series). Fiche copies are distributed by mail. In addition, the State Library's film centers in Anchorage and Juneau are a major source of 16mm films and video tapes for Alaska's schools and public libraries. In 1978, more than 45,000 films and tapes were circulated from the 16,000 titles held. The State Library also operates a special service for blind and physically handicapped people.

HISTORICAL CONTEXT

DECENTRALIZATION

Isolation between schools and school districts, coupled with the multiple agencies that have historically managed the State's schools,

has long precluded the delivery of comprehensive and equitable support to Alaskan schools.

Until June, 1975, there were city and borough school districts governed by locally elected boards; schools outside organized city or borough boundaries were operated by the Alaska State-Operated School System; and a number of village schools were operated by the Bureau of Indian Affairs (BIA). Schools in rural, predominantly Eskimo or Indian communities, were divided between ASOSS and BIA according to no geographic or cultural design.

In June, 1975, the Alaska Legislature decentralized the ASOSS and placed governance of rural schools in the hands of regionally elected boards. Twenty-one new Regional Educational Attendance Areas (REAAs) were formed. Boundaries were drawn taking into consideration socio-economic, linguistic, and cultural similarities and natural geographic barriers. While reflecting the strong commitment of the DOE and the State to placing as much control of education in local hands, decentralization increased demands upon the Department to provide adequate technical assistance. The DOE had to assist 52 rather than 31 school districts. Further, with the creation of the new rural school districts, there was increased likelihood of the transfer of BIA schools outside an REAA to the REAA district, thus continuing the move toward a single system of education.

In May, 1976, the State Board of Education took another step toward localizing control of education. It adopted new regulations that required the governing body of the State's school districts to provide an elementary school in each community which had eight or more children available to attend and, unless the community's school committee requested otherwise, to establish a secondary school in every community which had one or more available secondary students. Dramatic changes occurred almost immediately. In 1974-75, when most villages were sending their adolescents to boarding high schools, there were 28 high school programs (not necessarily through 12th Grade) outside incorporated municipalities. In the two fiscal years ending June 30, 1979, 109 villages received funds for construction of high school facilities; nearly all of them were new buildings.

Greater local control and greatly expanded educational opportunities increased the need for DOE support services and statewide resources to address the unique needs of rural students. The DOE initially responded by drawing together all known resources under a project called Systematic Planning Around Needs (SPAN). SPAN gathered and organized information about a variety of human and information resources such as a statewide talent bank of resource persons, national and in-state validated best practices, bibliographical data and abstracts of agencies which offer services to school age populations. These materials were to be requested and then made available via the U.S. Postal Service.

To further meet the resource needs of all districts, the Legislature created six Regional Resource Centers (RRCs) in 1976. These Centers were designed to provide locally chosen means to fill locally identified gaps in essential support services. In addition, the legislation permitted school districts to work jointly to provide cooperative services which would otherwise not be available because of the high cost of establishing all educational services in a single district.

Thus, telecommunications, and its application to education in Alaska, loomed ever more promising as a tool to create management and information channels that would help DOE provide the range and diversity of services demanded by localized control and also to provide quality education to students in rural areas.

ALASKA DEPARTMENT OF EDUCATION

The Alaska Department of Education (DOE) is charged with the responsibility to:

- exercise general supervision over the public schools of the State except the University of Alaska;
- study the conditions and needs of the public schools of the State and adopt or recommend plans for their improvement; and
- establish, maintain, govern, operate, discontinue, and/or combine area, regional, and special schools.

The executive head of the Department is the State Board of Education, a seven-member body appointed by the Governor and confirmed by the Legislature. One student is selected as an eighth (non-voting) member. The Commissioner is appointed by the Board, subject to approval by the Governor.

The Department's main facilities are in Juneau. Housed there are the executive administration, including the Commissioner, Deputy, and special assistants; Planning and Research Office members who concentrate on research, systems development, and student assessment; and staff members who provide information and distribution assistance for publications prepared for virtually every section of the Department.

Three commissions have been established by State statute, regulation, or Federal law, all with operating programs, staffs, and separate annual budgets. The Alaska Public Broadcast Commission, with staff in Anchorage, regulates public radio and television stations; the Alaska Rural Teachers Training Corps, also supported by staff in Anchorage, administers a post-secondary degree program designed to prepare Native teachers living in rural Alaska who are remote from existing campuses; and the Post-Secondary Commission, with staff in Juneau and Anchorage, reviews all post-secondary institutions, program offerings, and budgets, making funding and legislative recommendations. This Commission also administers the student scholarship financial aid program.

In addition to these Commissions, the Alaska Department of Education functions through five major divisions. Each of these contains a number of sub-groupings and programs: (1) Management, Law and Finance Division; (2) The Division of Education Program Support; (3) the Division of Vocational Rehabilitation; (4) The State Library, its branch units and State Museum; and (5) the recently created (July 1, 1981) Division of Educational Design and Implementation.

EDUCATIONAL NEEDS ASSESSMENT

The components and content of the ETA Project were selected and designed to be responsive to a number of the educational needs as identified by the "Department of Education Planning and Evaluation Survey" (Spring, 1976). The basic implementation approach was consistent with the findings of the "Telecommunications Alternatives Survey" also conducted in 1976 and subsequent to the Planning and Evaluation Survey.

DEPARTMENT OF EDUCATION PLANNING AND EVALUATION SURVEY

This Survey consisted of 69 Linkert items and two open-ended queries on a questionnaire distributed to more than 2,000 Alaskan educators. Respondents were asked to rate the importance of specific areas within four categories of concern: What services should the DOE provide? How should the DOE provide services? What problems have you had in working with the DOE? What areas should DOE support? A total of 36 percent of the mailed questionnaires were returned; the majority, about 77 percent, were from teachers and the remainder from principals and principal-teachers and specialists. Although the respondents were dominantly teachers, the conclusions were generally supported by educators in other categories surveyed. The study concluded that the DOE should:

- provide leadership in establishing and maintaining statewide goals, needs, and priorities;
- identify and disseminate educational information, media resources, and Promising Practices;
- examine and improve certification procedures;
- provide in-service training, especially through regional sessions;
- investigate alternate means of funding schools;
- improve communications (with local schools, both formal and informal);
- maintain support and emphasis on the basic skills areas, especially reading;
- develop new programs and curricula and disseminate information about them (especially programs in careers, thinking skills, and special education for the gifted).

SURVEY VALIDITY

The percentage of total returns in each geographical area closely approximated the percentage of the total population of educators in those areas, except for the relatively small response from the Interior:

Area	Percent
Southcentral	61.0
Western	8.0
Northwest	4.4
Bristol Bay	3.4
Interior	3.0
Southeast	19.0
Aleutian Chain	1.0

The percentage of total returns from each of the four districts approximated the percentage of the total population of educators in those districts:

District	Percent
Anchorage	30.6
1,000-9,000 persons	39.0
400-999 persons	11.3
1-399 persons	19.1

The percentage of total returns from each of the four occupational groups closely approximated the percentage of the total population of educators in these groups:

Occupational Group	Percent
Superintendents	4.7
Principal or Principal-Teachers	14.3
Teachers	77.7
Others	3.4

School superintendents requested that DOE:

- provide program consultation;
- provide management assistance;
- develop a student assessment program;
- provide an assessment of educational statutes;
- sponsor statewide conferences.

Principal or principal-teachers expressed a need for the DOE to:

- conduct in-service training;

- coordinate services through Regional Resource Centers;
- provide knowledge of whom to contact for services;
- develop special programs for educators.

Teachers expressed a need for the DOE to:

- design and conduct in-service training;
- regionalize its services;
- coordinate services through Regional Resource Centers;
- provide program administration guidelines;
- provide a listing of whom to contact for specific purposes in DOE;
- develop special education programs.

Persons classified as "others". (specialists, etc.) encountered problems with:

- calendar deadline conflicts;
- inconsistent responses from DOE staff;
- reaching appropriate DOE personnel;
- lack of knowledge of legislative amendments and new laws.

A copy of the Survey instrument and a detailed analysis of results are included in Appendix A.9, to the report entitled, "Results of Department of Education Planning Survey" in the "Operational Plan: Educational Telecommunications for Alaska Project," Alaska Department of Education, December 1, 1978.

THE TELECOMMUNICATIONS ALTERNATIVES SURVEY

Two basic strategies of data collection were employed:

- A tabloid, "Telecommunications and the Future of Alaskan Education," an associated response sheet, and a video tape were mailed to 6,000 Alaskan educators. The tabloid and video tape explained the telecommunications alternatives available, presented some possible telecommunications solutions to educational problems and asked the educators to rate and comment upon the importance of telecommunications in providing solutions to educational problems they encountered.
- Presentations were made before local boards of education and at a number of meetings of Alaskan educators. The tabloid and response sheet were distributed for later comment while remarks made at the meetings were recorded for immediate analysis.

Because the information content of the distribution material was high, requiring heavy concentration and appreciable time, and since the subject matter was new to many, few responses were anticipated. (The main intent of the mailing was informational.) Seventy-five responses were received, however, and the data culled from these are summarized in Table 1. The percentage of responses is noted in each of the five categories (from high to low priority). The items receiving the highest ratings were those concerning individually initiated instructional resources (as opposed to required), staff development, informal information exchange, increasing input and information on State guidelines, and forms and computerization of reporting methods. These findings were very much in accord with the results of the "DOE Planning and Evaluation Survey."

TABLE 1

COMMUNICATIONS APPLICATIONS (MAIL RESPONSE)
MEAN RESPONSE (%)

	HIGH PRIORITY 5	4	3	2	LOW PRIORITY 1	MEAN
INSTRUCTIONAL RESOURCES						
For Getting Resource Material	37	19	17	17	10	(3.58)
To Expand Courses and Curriculum	39	28	14	7	12	(3.73)
For Getting Research Findings	25	19	32	13	11	(3.31)
STAFF DEVELOPMENT						
For Earning Recertification Credits	24	16	27	10	23	(3.09)
For Keeping Recertification Records	17	6	27	15	35	(2.54)
For Providing Training Opportunities	43	28	13	4	12	3.86)
INFORMATION EXCHANGE						
To Informally Exchange Information and Ideas	21	32	37	0	10	(3.52)
To Improve School Board Communication	17	22	33	17	11	(3.16)
To Distribute Department Information in Media	12.5	12.5	50	25	0	(3.13)
To Increase Public Input to Department	16	42	26	11	5	(3.52)
MANAGEMENT						
To Arrange Meetings on Short Notice	15	16	25	16	26	(2.78)
To Increase Input and Information on State Guidelines and Forms	18	29	27	10	16	(3.22)
To Offer Computerized Reporting Methods	27	16	37	8	12	(3.39)

SELECTION OF TELECOMMUNICATIONS ALTERNATIVES FOR THE ETA PROJECT TO MATCH IDENTIFIED EDUCATIONAL NEEDS

Both the DOE Planning and Evaluation Survey and the Telecommunications Alternatives Survey provided considerable input

and substantiation of the direction being taken by the ETA proposal design team. Five important needs that could be significantly supported by telecommunication and computer technologies were the foundation of the proposed Project:

- NEED #1: To establish an administrative and instructional communications network characterized by interactive capacity, minimal on-site support personnel, and cost-effectiveness.
- NEED #2: To establish a method for rapidly accessing repositories of a wide variety of instructional materials and related information.
- NEED #3: To provide individual student diagnostic services, especially in the areas of reading and computational skills, and to do so on an as-needed basis.
- NEED #4: To provide direct instructional support in those situations where limited staff required the teacher to serve in the role of facilitator rather than teacher, per se.
- NEED #5: To provide teacher in-service training and teacher support in a manner that does not always require physical relocation of the staff.

To meet these needs, the entire range of transmission alternatives from one-way audio to two-way video was considered. The telecommunications formats evaluated were:

- Audio-simplex (one-way) - (1)
- Audio-duplex (two-way) - (2)
- Radio - (3)
- Computer information and data - (4)
- Television - (6)
- Television and two-way audio - (7)
- Television and teleconferencing (interactive) - (12)

The numbers in parentheses indicate the comparative satellite earth station and satellite transponder costs. When these seven telecommunications formats were compared with the five educational needs, the two-dimensional matrix of Table 2 resulted.

The selected formats are indicated by an "X". The selections were based on the following two criteria:

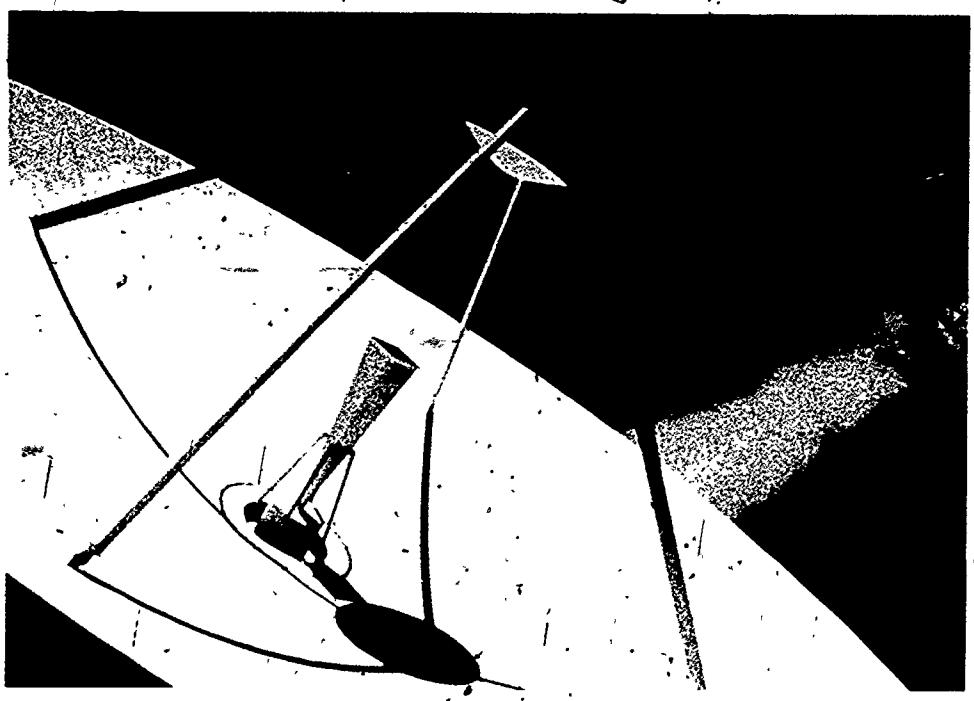
- The telecommunications medium selected to meet each need must provide a technically appropriate solution to the need and be acceptable to the ultimate users of the system; and
- Where alternative media could be brought to bear on the solution of a particular need, the most effective alternative affordable would be chosen.

TABLE 2

TELECOMMUNICATIONS FORMAT

Educational Need	Audio Simplex	Audio Duplex	Radio	Computer Information and Data	Television	Television and Two-Way Audio	Television and Teleconferencing
1 Administrative Communications		X		X			
2 Resource Identification and Transmission		X		X			
3 Student Diagnosis		X		X			
4 Classroom Instructional Support		X	X	X			
5 Staff Training and Support		X	X	X			

The selected transmission formats were all narrowband (requiring small amounts of frequency spectrum). Each was widely used and took maximum advantage of what was already in place. None of the last three telecommunications formats was selected. The reason was economic -- it was too expensive to upgrade the earth stations, pay the yearly cost of a transponder, and purchase, install, and maintain the necessary television-associated equipment for full-motion video.



ALASKA KNOWLEDGE BASE SYSTEM

THE FEDERAL AND STATE COMMITMENT

The Educational Telecommunications for Alaska (ETA) Project was designed to address several of Alaska's critical educational needs through the judicious application of telecommunication and computer technologies. The educational needs were determined by the Alaska Department of Education in its comprehensive survey conducted in 1976.

Recognizing that to develop, test, and begin to institutionalize a technologically supported educational system was a long-term effort, both NIE and the Alaska DOE agreed on a four-and-one-half year Project. To ensure continuity, Letters of Agreement were exchanged between the two organizations committing resources over that period of time. The funding was to be heavily Federally supported at the onset with the burden shifting to Alaska during the later years. By the end of the Project, two-thirds was to be supported by DOE. Beginning in January, 1982, total responsibility would be borne by the State.

In July, 1977, DOE formally submitted a letter to the NIE Contracting Officer stating that the Commissioner was committed to seeking funds to support the ETA Project according to the following schedule. Federal and State support by Project Year is shown.

Project Year	Federal Support	State Support
9/77 — 12/78	$1,600,000	$ 225,000
1/79 — 12/79	900,000	583,000
1/80 — 12/80	600,000	958,000
1/81 — 12/81	300,000	945,000
1/82 — 6/82	—0—	345,000

Federal support officially terminated on December 31, 1981. The $345,000 shown commencing in January, 1982 is estimated to be the yearly State-supported maintenance level cost. Other costs will be covered by the user communities.

ETA PROJECT

ETA GOAL AND OBJECTIVE

The educational needs are a direct outgrowth of problems associated with distance, isolation, and sparse population. Modern telecommunications, primarily satellite communications, recognizes no geographic or weather barriers. It is relatively inexpensive and experience has shown that interaction via telecommunications can well substitute for many business and social exchanges, even many where it is deemed desirable to have face-to-face meetings.

The recommendations of the DOE "Planning and Evaluation Survey" and the OT's "The Telecommunications Alternatives Survey" were analyzed and resulted in three fundamental needs that could be addressed by the technology:

- the need to establish an administrative and instructional support communications network characterized by interactive capacity, minimal on-site support personnel, and cost effectiveness;
- the need to establish a method for rapidly accessing repositories of a wide variety of institutional materials, resources, and related information;
- the need to provide direct instructional and teacher support to rural secondary schools in those situations where limited staff requires the teacher to serve in the role of facilitator of learning rather than providing direct instruction in the conventional sense.

Based on these needs, the Project established as its overall Goal, "An educational telecommunications network installed and operating statewide which is responsive to Alaskan needs and provides equality of access to quality educational programs and support services."

The Project's immediate Objective, to be achieved in the four-and-one-half years of Federal and State joint sponsorship, was: "A model educational telecommunications network developed and implemented containing user accepted, proven, affordable, and effective components." The three components of the Project in direct support of this Objective are:

- Administrative Communications Network;
- Resource Identification and Retrieval System (later renamed the "Alaska Knowledge Base System"); and
- Individualized Study by Telecommunications.

This report documents the implementation, evolution, and institutionalization of the "Alaska Knowledge Base System."

ALASKA KNOWLEDGE BASE SYSTEM EXPECTED RESULT

A recommendation of the 1976 Department of Education Planning and Evaluation Survey was that "emphasis should be placed on a coordinated plan to disseminate information, Promising Practices, and talent bank data." The initial action taken to satisfy this need was establishment of Project A-TIP (Alaskan Talent Information and Promising Practices) with funds granted by the National Institute of Education. Through this project, educators gained access to State and local resources and to an information retrieval and dissemination service provided by the San Mateo Educational Resource Center (SMERC) located in California.

The primary product from Project A-TIP was to be a statewide system for continuous exchange of information and sharing of products between educational agencies within the State and several agencies outside the State. However, a major problem encountered in the project was the slowness and/or unavailability of vital telecommunication links. The problems encountered in requesting information and then awaiting receipt of the information were exacerbated by geography, weather, and the four time zones spanned by the State. Telephone communication was very difficult and return of the requested information could become hopelessly bogged down in the turn-around time of mail delivery. Thus, the Alaska Knowledge Base System component of the ETA Project was designed to overcome these difficulties and also to be a microcosm of the eventual statewide system. The purpose was to test and evaluate elements of the model system so that expansion could proceed based on this testbed of proven performance. The following Expected Result was established for the Alaska Knowledge Base System:

"Using the telecommunications system, teachers and administrators have rapid access to repositories of information about a wide variety of instructional and research documentation and related materials for administrative decision-making and curriculum improvement."

The "telecommunications system" referred to is the Electronic Mail System (EMS) developed under the first component implemented by the ETA Project, the Administrative Communications Network. The purpose of that Network was to provide a telecommunications service interconnecting the DOE, school district offices, Regional Resource Centers (RRCs), and local schools.

Associated with this Expected Result were a series of Verifiable Indicators to be used as measures of the model's success. These Indicators were the basis for future evaluation of progress. Successful accomplishment of all Indicators marked achievement of the Expected Result and thus, successful component completion. The Verifiable Indicators specified were:

- *BY 1980*
  - 90 percent of the districts and all RRCs will have the ability to request information through the EMS;
  - there will be an average of at least one information request per district per month;
  - the Knowledge Base System, consisting of Resource Agencies, Talent Bank, Promising Practices, Nationally Validated Programs, and Commercial Resources, will be in a computer file and will be accessible to DOE personnel through interactive terminals.
- *BY 1981*
  - the computerized Knowledge Base System will be directly accessible to all RRCs as well as the DOE;
  - there will be an average of at least three requests for information per district per month;
  - access to information about educational resources will be substantially improved (as denoted by user acclaim).
- *BY 1982*
  - the computerized Alaska Knowledge Base System will be directly accessible to 50 percent of the school districts as well as all RRCs and the DOE;
  - 70 percent of the local districts will consider the services of the Alaska Knowledge Base System of sufficient value to support its continuance;
  - the costs associated with the Alaska Knowledge Base System are affordable and accepted by 90 percent of the users.

It was recognized from the beginning, however, that there were factors outside the control of the Project that could adversely impact on its achievement. Therefore, "Assumptions" were listed that were tracked along with accomplishments in order to evaluate performance. This is an essential element in making a proper judgment about the

introduction of any innovation. The "Assumptions" associated with the Alaska Knowledge Base System were:

- critical personnel can be recruited and retained in Juneau;
- local and long-distance intrastate line quality is sufficient for the development of required telecommunications links;
- RCA Alascom tariff rate structure does not exceed budget limitations;
- equipment is rugged enough to operate reliably in the Alaskan environment;
- the telecommunications program at the National Institute of Education or alternate Federal agency continues to be viable for the term of the Project;
- Federal funding Is available at the designated level and on schedule;
- Systematic Planning Around Needs (SPAN) is perceived as valuable to Alaskan educators;
- timely delivery of materials identified through search procedures will be feasible.

EVOLUTION OF THE TECHNOLOGY-SUPPORTED ALASKA KNOWLEDGE BASE SYSTEM

One of the most important purposes this report can serve is to document the introduction of this System into the educational life of Alaska. The introduction of an educational innovation that achieves widespread acceptance in a short time (several years) is an occurrence that should be presented in detail so that others may adopt and/or adapt what has been learned to their own situations and circumstances. The key to learning how this was accomplished lies in understanding the conditions which existed at the time of the evaluations and which resulted in the recommendations that were made. Since formative evaluations were an integral part of management's decision-making process, the following narrative presents them within the time frame in which they occurred, rather than as a single set of results at the end of the report. This is an important distinction because, in seeing them presented in this way, the reader will understand the total environment in which the evaluations were conducted and thus have better insight into why those results were obtained and why the recommendations were as noted in the report.

The Alaska Knowledge Base System consists of two parts: the Knowledge Base files and the technological system that links the users to the host computer housing the files. The same care and thought went into the technology to ensure reliability and simplicity of user interface as went into the content of the data files to ensure they would be user-accepted. These data files were the result of user input and were tailored to the Alaskan educational environment. The technological system was also molded in the image most desired by the users, but tempered by the restricted options afforded by the climate and geography of Alaska. Thus, the evolution of the Alaska Knowledge Base System cannot be separated from the evolution of the EMS, and much of the formative evaluations that shaped the final system were performed as part of the development of the EMS. It should be noted, however, that the Knowledge Base is only one of many sources that are now available to educators. The Alaska State Library provides access to these others. Requests may be forwarded via the Electronic Mail System.

ALASKA KNOWLEDGE BASE COMPONENT

In 1976, 21 new school districts were formed in accordance with the mandate from the State Legislature. These 21 districts were in rural areas that had previously been serviced by a variety of agencies. By

including them under the aegis of the DOE, the total number of districts to be served rose to 52. However, because they were rural and, thus, had fewer resources, the new districts required many more services and greater assistance. Small rural schools cannot afford the number of teachers necessary to cover the range of courses required for a full high school curriculum; also traditionally, the turnover rate of rural teachers is high. Faced with this 41 percent increase in client districts, the DOE sought alternative methods for delivering services.

In 1977 a State Board of Education policy directive reflected its high priority for "communication" by stating that, "Current efforts at communication should be increased and processes developed to meet on-going communication needs, increased communications with the public and other educational Institute of Education Dissemination projects, and the development of telecommunications."

Based on this directive, a large-scale planning process was initiated to integrate all State and Federal dissemination efforts into a single comprehensive plan for the delivery of educational services to the districts. The result of this planning was development of the Systematic Planning Around Needs (SPAN) activity. Endorsed by the State Board of Education, SPAN tied together all dissemination activities within DOE (Appendix A). It called for a statewide system of matching resources with needs. The DOE formed a new section to coordinate these dissemination activities, the Program Development and Dissemination Unit, within the Division of Educational Program Support.

To meet the broad range of activities and services called for under the plan would have required a large organization within the DOE. Therefore, rather than attempting to serve the districts directly, the Division of Educational Program Support identifies and brokers services and resources. Under this philosophy, the dissemination of information function is to :

- make educators aware of a particular idea, concept, or service;
- assist educators in matching resources with the identified educational need;
- assist local districts in better decision-making methods; and
- assist in the use or implementation of an educational improvement at the local level.

The high priority set for identification and dissemination of educational information, media resources, and Promising Practices made this a prime objective of the ETA Project. The approach was to develop a telecommunications-linked resource identification and retrieval system for educational administrators, teachers, and other school staff.

ALASKA KNOWLEDGE BASE CONTENT

The Alaska Knowledge Base today is a major component of SPAN and consists of seven data files. The combined purpose of the files is to provide the school system with information pertaining to the availability of curriculum materials, successful classroom programs, and resources (individuals and organizations) available to serve the schools. The key to acceptance of the Knowledge Base lies in the fact that all information placed in the data files is first approved by the educational community as pertinent to the Alaskan environment. Thus, the Alaska Knowledge Base is a tailored data base, specifically designed to support the State's educators. The files of the Knowledge Base are:

- Client Profiles (local education agency profiles);
- Promising Practices (validated model programs developed and in use in-State);
- Nationally Validated Model Programs (selected for their appropriateness to Alaska);
- Alaskan Talent Bank (human resources);
- Service Agencies (those which provide technical assistance or materials to local educational agencies);
- Alaska-Developed Materials;
- Commercial Resources (suppliers of curriculum materials, for example).

The individual files contain the following information:

- *Client Profiles*

  Contain information about each of the Alaskan school districts. This information includes participation in activities related to needs identification and solution; use of resources to upgrade the educational system; special projects being conducted, e.g., relative to computer education; Promising Practices contributed and/or used; etc.

- *Promising Practices*

  Identification of promising or exemplary programs. Anyone may make the initial nomination of a program considered to be exemplary. Nominations must be verified by the district administration – a validation of a school as a source for a Promising Practices program implies certain commitments on the part of the school. Following verification of the nomination by the district administration, the school staff goes through a self-assessment, using DOE-established Criteria for Excellence. If the results of this self-assessment indicate that the program is a Promising Practice, then a validation team visits the school to verify the assessment result.

  The Criteria for Excellence, adopted by the State Board of Education, has been established for both elementary and

secondary reading, mathematics, district in-service, district correspondence study programs, bilingual education, and gifted and talented programs. Criteria for Excellence are being developed for other areas. All criteria are developed through a cooperative effort of educators in the field and department staff.

Information about the validated programs is widely distributed through *Alaska Education News* and other media. Each fall a statewide symposium is held, giving validated schools an opportunity to share through formal presentations and informal exchanges. Specimen sets of materials from the identified Promising Practices are collected for deposit in the Regional Resource Centers. People involved in Promising Practices programs are encouraged to become members of the Talent Bank, making their expertise available to other Alaskan educators.

- *Nationally Validated Programs*

More than two hundred exemplary/model programs have been validated by a Joint Dissemination Review Panel of the U.S. Office of Education and the National Institute of Education. From these, approximately 120 have been selected as appropriate for possible adaptation in Alaska.

- *Talent Bank*

The Talent Bank is a mechanism for bringing in-state instructors and administrators with special expertise to other schools needing these skills. State funds are used for the person's travel, per diem, and substitute fees. An educator's participation in the Talent Bank must be approved by the district administration. Recruitment for the Talent Bank is an open process.

- *Service Agencies*

Many agencies provide on-site consultation and other technical assistance services to districts. The abstracts include the agencies' areas of specialization and expertise.

- *Alaska-Developed Materials*

Abstracts of Alaska-Developed Materials identify documents especially created to meet the educational needs of Alaskans. Information contributed by school districts and educators around the State is placed in the data file. Prior to July, 1981, this information was stored and retrieved from the San Mateo Educational Resource Center (SMERC). Since July, 1981, however, the State has assumed responsibility: it assigns its own numbers to documents and fills requests by compiling documents for transmittal directly from its own fiche. Besides bibliographic data, the abstracts include such information as subject area, target audience, teacher skills necessary to use the materials, major concepts taught, student results obtained, facilities required for use, etc.

- *Commercial Resources*

Bibliographic data are listed for commercial resources, such as private consultants and textbook publishers, which may aid educators. Inclusion of a commercial resource firm in the Alaska Knowledge Base does not mean that the firm is endorsed by the State Department of Education.

Examples of information stored in the computerized Alaska Knowledge Base related to each of the above files is contained in Appendix B.

TECHNOLOGICAL COMPONENT (Historical Context)

In the operational phase of the Alaska Knowledge Base System, primary access to the data files is via the Administrative Communications Network. This Network was established to provide support for administrators, teachers, and other school personnel so that important information could be exchanged reliably and in a timely manner between districts and with the DOE and others. The Electronic Mail System (EMS) evolved from this need.

EXPLORATORY TEST EVALUATION (1977)

To test the concept and acceptability of a telecommunications-supported information identification system, information search requests from the San Mateo Educational Resource Center repository were included as an integral part of the Exploratory Test and evaluation

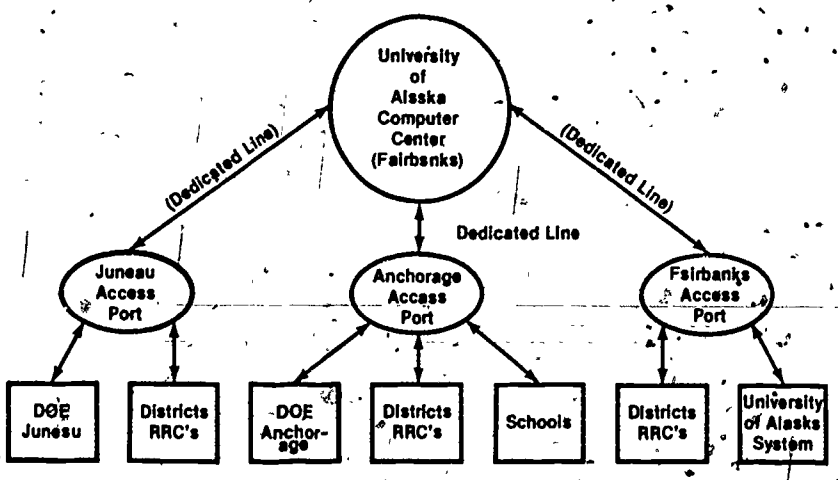
of the Administrative Communications Network's Electronic Mail System conducted over a period of several months. As mentioned previously, SMERC is an educational information service located in California. Among other services provided, are searches of the Educational Resource Information Center (ERIC) and a special file which includes one-time and special publications not included in ERIC. SMERC returns a complete package, including a computer printout, journal articles, and microfiche on the topic requested.

Requesters of information could not directly access SMERC, however. The procedure was for the requester to put a message, via a linker (EMS operator), into the DOE electronic "mailbox." The DOE then formatted the search strategy and sent the request to SMERC. The response was returned via mail directly to the query originator.

Figure III-1 schematically represents the communication network originally postulated in the NIE proposal for the ETA Project (1977). The requester provided the message for a search to the local terminal operator located at the district office who would send the search request via the EMS. The information flow was controlled by the University of Alaska computer which contained the individual files ("mailboxes"). Each user was allocated a specified portion of computer memory exclusively for his/her organization's use. As mentioned, messages were entered by an operator with a proper and active identification (ID) number and could be addressed to any active recipient's file; in this instance, DOE. Each user could check the assigned mail file in order to determine if messages had been received. The "mail drop" computer could be accessed directly or via special telephone lines from access ports in Juneau, Anchorage, and Fairbanks. (In 1978, Ketchikan was added as the fourth node to this network.) Operators would phone up the nearest access port from their on-site terminal locations. Satellite communication links used the RCA Satcom satellite and commercial earth stations maintained by RCA Alascom.

Figure III - 1

ADMINISTRATIVE COMMUNICATIONS NETWORK DIAGRAM



Key features of the initial Electronic Mail System proposed to NIE were use of:

- an existing computer facility at the University of Alaska at Anchorage;
- the "mail-drop" system existing on the University computer;
- very simple (dumb) terminals at district sites in order to make the System easy to use, to keep site costs low, and to keep maintenance to a minimum;
- real-time interaction with the System by operators; i.e., messages/searches were composed and sent or received during the telephone call. This approach also allows for the simplest and least expensive on-site terminals.

The first Exploratory Test period began in late 1977 and continued into 1978. Training was provided; each operator received a personal copy of the "ETA System User Handbook." Since the initial concept was to interact with the "mail-drop" computer in an on-line, real-time mode at all times, there was little need to present technical details on the simple terminal. Recognizing that the EMS was a totally new experience for all involved, a Suggestion Box was included and a "Postmaster" was available at all times to assist users in solving problems.

By mid-January, 1978 (part-way through the Exploratory Test), actual testing with the "mail-drop" system showed that the use of terse, abbreviated command language along with cryptic computer prompts (statements generated by the computer requesting additional information from the user) were not suitable for EMS/Knowledge Base operators. A search of other State computer systems found that none was configured with appropriate software for on-line, real-time interaction as required by the initial system concept.

An RFP was prepared and issued promptly by ETA Project management. In response to that RFP, Systems Northwest Corporation of Juneau offered to provide access to their Digital Equipment Corporation PDP 11/70 minicomputer which also supported the Alaskan Marine Highway's reservation and electronic mail system. A message program was designed with ease of use and acceptability to ETA users stressed in the command language. The System became operational on April 1, 1978; on-site training was conducted at each of the participating sites.

Despite difficulties encountered with the initial "mail-drop" system, the results of the Exploratory Test indicated a high level of success. Specifically:

- User attitude was strongly positive.
- Most messages were picked up quickly, representing in most cases substantial improvement over mail.

- Non-technical users were trained easily and were comfortable with the System.
- Transmission links provided by the carrier, RCA Alascom, were generally acceptable for data transmission.

Only Kodiak and Clear encountered transmission problems. The difficulties were related to quality of local telephone lines - a problem that plagued many remote sites in subsequent tests.

After an additional month of service, the EMS Postmaster conducted a survey relating basically to reactions of the users to their interface with the EMS protocols and features. Although many of the recommendations do not apply to a system designed strictly to access information data bases, many readers will have information data bases as part of a larger system - just as the Alaskans did. Therefore, the full range of user recommendations is of great interest.

RECOMMENDATIONS

- *Ports*

  Sufficient telephone lines should be available to users so that they will be able to dial up the computer at any time for sending and receiving messages, without encountering busy signals.

- *Confidentiality*
  - User names should be related to agency account numbers in such a way that a user in one agency cannot access the mailboxes of another agency without permission.
  - District/agency account numbers should be unique and not in sequence so that a user could not guess another user's account number on the basis of his/her own.
  - Users should have the ability to change their passwords in direct connection with the computer and not through an intermediary, e.g., the Postmaster.
  - Passwords should be masked, both on hard copy and on the display terminal, to avoid detection.

- *Prompt/Command Structure*
  - The commands established to follow computer prompts should represent meaningful actions or procedures. Users prefer to enter single characters in response to prompts, as long as that character stands for a word that is logical and easy to remember.
  - To reduce possible confusion when responding to prompts at different points in the mail system procedure, each command should be unique. For example, the command "End" or "E" should only be a response option at one point in the procedure, not two or three.
  - Rather than the aid message printing out automatically when a user enters an incorrect command, the computer prompt could

simply repeat until the user enters an acceptable response. An "AID" or an "Enter Aid for Help" message could print out when the number of command options is large.

- *Editing*

  - The most important element in the area of editing is ability to compose, correct, and amend message/search text off-line. Users probably will be more inclined to use the System if there is no need to worry about time and costs while composing messages/searches.
  - It would also be helpful for users to be able to make corrections and insertions in the middle of a message without having to re-type everything that follows the change, and without affecting the hard-copy appearance of the message/search request.
  - Users prefer visual feedback while they correct words and characters within a line.
  - More extensive prompts are helpful to users during the training period. However, once the editing steps are learned, most users would prefer to use shortcuts. As an example, the command, "CL6," could be substituted by those familiar with the system with no wait for the prompt, "change which line?".

- *Message Efficiency*

  - As an aid to Agency and district operators who usually serve several originators, there should be a fast way to switch from one mailbox to another, once he/she is logged on. A message option to "change mailboxes" would probably be sufficient, although it would still require that the operator know the password for each mailbox addressed.
  - Message receipt should be acknowledged automatically, such that a user could find out which messages sent had been printed by the intended recipients – if (and when) that information is specifically requested. Some messages could call for a "return receipt" which would require action on the part of the receiver.
  - Users should be able to forward messages from one mailbox to another. This would be particularly helpful in transferring requests for information and for relaying trouble reports. This, or some other message-storing capacity, would also save time in re-sending garbled or "lost" messages.
  - The ability to send the same message to more than one mailbox should be enhanced such that the recipient can tell whether the message received is an informational ("carbon") copy from the sender, or a message requiring action or response on the part of several addressees. This information should be part of the message-composition sequence; the sender should *not* have to remember to follow a particular format in the body of the message.

- In addition, when a complete copy of the message is listed as an editing step before sending, *all* address information should print, not only the body of the message. This would allow the sender to change addresses or subject, without having to re-create the entire message; it would also provide a *complete* printed copy of messages/searches sent for retention in hard-copy file.
- Users should be able to save messages without the message headers printing out whenever the mailbox is checked. They should also be able to delete a message by number only, without having to wait for it to print out.

• *Conducting Business*

- Users should be able to use standard address lists, as well as to make address lists of their own. Address lists should be stored in a "file" and called up and used or amended as often as necessary.
- Requests for searches should be handled through a subroutine which would give prompts for all information required to perform a search. (This will be very important at the time search originators have access from their own sites.)

• *Training*

- The user should be provided complete instructions in the areas of equipment operation and problem solving. Explanations of every keyboard feature should be included in the User Handbook. A simplified troubleshooting guide should also be provided, as well as instructions for differentiating between terminal, phone line, and host computer problems.
- The user directory should be available in the computer for users to call up as needed. User directory updates should be handled automatically and should be available as often as district users care to print them out.
- Complete information on forms display and usage should be provided to users.
- It would be helpful to have both the full command word and a one- or two-character abbreviation accepted as a response to the computer prompts.

As a result of the Exploratory Test findings, it was decided that changes to the existing network were too extensive for simple revision. Concurrently, an 87 percent increase in all intrastate long-distance tolls was instituted by RCA Alascom, the State's only longlines communication carrier. This drastic rate increase made it imperative that an alternative to conventional real-time, on-line interactive processing be found or else the communications costs would eventually drive users away.

For cost comparison purposes, a study was undertaken of alternative ways to interact with the host computer in Juneau. It included both real-time (as in the original system) and non-real-time interaction. Non-real time involved composing messages at the local sites *before* connecting to the host computer. The completed messages are then transmitted in bulk (batches) to the host for processing.

The EMS design that was developed, based on the alternatives study, increased efficiency by:

- off-line (performed prior to dialing into the Mail System host computer) pre-processing (editing) of messages at all sites;
- remote control of the site storage devices by the host computer so that telephone on-line time could be reduced;
- supporting both interactive and batch operations;
- detached batch-processing at the host (permitting the host computer to process messages received from sites after users have hung up the phone); and
- variable-length messages from different sites accumulated at special nodal cities, combined into a single digital data stream and transmitted to the host computer in Juneau. This makes efficient use of telephone lines.

ALASKA KNOWLEDGE BASE SYSTEM COST STUDY

In mid-1978, a study was undertaken to determine specifically what was involved in computerizing the seven Alaska Knowledge Base data files and to use that information to estimate the cost of implementation. For analysis purposes the four-year period, 1979-1982, was used to project growth of both data base and number of inquiries. Table III-1 lists the assumptions that formed the basis for the analysis. The data file in the table designated "Sel. AK Biblio. Data" is the Alaska-Developed Materials, the terminology used today.

Table III - 1

KNOWLEDGE BASE FILES

File	# of Records 1979	# of Records 1982	Record Length (Characters)	Inquiries Per Month 1979	Inquiries Per Month 1982
Agencies	80	100	1000		
Talent Bank	200	300	500		
Model Programs				50	100
Promising Pract.	50	100	1000		
Nationally Valid.	50	100	1000		
Sel. AK Biblio. Data	200	2000	500	100	200
District Profiles	51	100	2000	10	10
Totals	631	2700		160	310

The host computer assumed was the same machine used for the EMS, a Digital Equipment Corporation PDP 11/70 with at least 16 ports (permits access to the computer by 16 users simultaneously). Sufficient information storage was assumed to run complex computer applications and to store large amounts of data (76,000,000 characters of information for direct access). The on-site (user) terminals were assumed to be "intelligent" (processing terminals) as opposed to "dumb," i.e., microcomputers capable of running programs and storing information to be sent to the central computer in a batch mode (i.e., searches are composed before calling up the host computer). Long-distance communication costs are thus incurred only for the time required to send the search requests. Not only would costs for on-line searching be reduced but also the micro could receive and store information received from the host. If desired, the operator could interact directly with the host in the on-line, real-time mode.

Several alternative operational modes were assumed (compatible with those analyzed for the EMS alternatives study) in order to develop the comparative cost analysis and thus be able to establish the most cost effective mode of operation. The alternatives are shown in Table III-2.

Table III - 2

COMPUTER SYSTEM ALTERNATIVES

A. Batch System:
Records are stored on magnetic tape.
Additions, changes, and deletions are batched and run on a regular basis, such as once a week.
Requests come to DOE from RRCs and local districts by EMS, mail, or telephone.
Requests for information are batched and run on a regular basis , such as once a day.

B. Interactive System:
Records are stored on disk.
All additions, changes, deletions, and requests for information are made interactively by DOE.

B1. DOE Interactive Only
Requests come to DOE from RRCs and local districts by EMS, mail, or telephone.
Responses are by EMS, mail, or telephone.
DOE updates the files and runs all requests.

B2. DOE and RRCs Interactive
DOE updates the files.
Requests come to RRCs and DOE from local districts.
RRCs and DOE run the requests.
Responses to local districts are made by EMS, mail, or telephone.

B3. DOE, RRCs and Local Districts Interactive
DOE updates the files.
Requests are run by agency needing information --DOE, RRC, or local district.
Reports are printed on terminals at requesting agency.

In the batch mode (Approach A), the Knowledge Base would be stored on magnetic tape. Requests for information and changes to the data base would be accumulated and then processed by the host computer at a convenient time. Users would pick up their responses at a later time.

In the interactive mode (Approach B), the data bases were assumed to be stored on disk. Requests for information and changes would be entered immediately and the requests for information would

be responded to immediately. Under this mode, several alternatives were analyzed. All possibilities are described in Table III-2.

In all the alternatives considered, the DOE was assumed to handle all maintenance of the data bases (additions, changes, and deletions). Therefore, interactive alternatives in Approach B applied only to retrievals and not to changes.

Cost estimates included in the study covered the costs for computer program development, testing, implementation and documentation, computer operation and maintenance, use of the EMS, and long-distance telephone charges. The cost breakdown used was:

- *Development and Implementation*
  - Development of user specifications
  - Detailed systems analysis
  - Programming
    - File maintenance - additions, changes, deletions
    - Retrieval
    - Use statistics
  - Documentation
  - User instructions
- *Operations and Maintenance*
  - Data storage
  - Computer time
  - Telephone
  - EMS use

The detailed analysis and costs are included in the report, "Initial Systems Analysis and Cost Feasibility Study for SPAN Knowledge Base System," noted in the bibliography listed at the back of this volume.

A summary of costs for development of the Alaska Knowledge Base System and its operation for four years (1979-1982) under each of the four alternatives, is shown in Table III-3. Of the three interactive alternatives, the least expensive was B3, where all agencies - local districts, RRCs, and the DOE - were interactive. The most expensive was B2 where the DOE and the RRCs, but not the local districts, were assumed interactive. The primary reason for the difference in costs is that Alternative B2 involves sending a large number of EMS messages between the local districts, the RRCs, and the DOE. With all agencies interactive under Alternative B3, much or all interagency interaction could be eliminated. Thus, EMS costs were very low or non-existent.

It will be noted, with some surprise perhaps, that the batch mode of operation is *more expensive* than the on-line, real-time interactive

mode designated as B3 in Table III-3. Analysis showed that the reason for this was that the EMS detached batch mode's use of the host computer was an expensive operation compared to other costs. In Approaches A and B3, all costs considered in the analysis versus costs associated with use of the EMS (detached batch mode) show that the monthly cost in 1982 would be:

	Approach A	Approach B3
Use of EMS (detached batch mode)	$ 1,240	$ 0
All Other Costs	137	952

If the Alaska Knowledge Base System were the only use for the EMS it would have remained very simple. User terminals could have stayed "dumb" since on-line interaction would have been the only operating mode necessary. However, most of its users, producers of the greatest volume of traffic, were those who used the System for administrative traffic, those messages requiring no immediate feedback from the computer, unlike that necessary to perform searches. It was this requirement that dictated the final configuration rather than the Knowledge Base use. The high-volume users demanded that communication costs to them be minimized; the way to accomplish that was to limit the amount of time they were connected to the host computer. Therefore, although total cost for detached batch operations was higher, the State paid the lion's share. From the users' standpoint, detached batch was the preferred mode.

Table III - 3

COMPARATIVE COSTS FOR DEVELOPMENT AND OPERATION (1979—1982)

	ALTERNATIVE			
	A	B1	B2	B3
DEVELOPMENT	$24,500	$24,500	$ 24,500	$24,500
OPERATION	50,616	57,216	76,728	35,496
TOTAL	$75,116	$81,716	$101,228	$59,996

From the Knowledge Base users' point of view, it was clear from the cost study that it would be desirable to go immediately to the B3 mode; i.e., all users - DOE, RRCs, and district linkers - would have direct access to the data files. However, the need to provide this service as quickly as possible required that this goal be reached in three steps.

By implementing B1 first, it was necessary to train only a relatively few DOE linkers to access the data base. This could be accomplished in short order - all requests would funnel through them. Concurrently, RRC linkers could be trained and as new linkers became available, larger volumes of traffic could be handled. Because of the large number of site personnel, it would be 1982 before all were capable of interacting directly with the Knowledge Base.

IMPLEMENTATION PLANNING

The encouraging results of the cost study and the acceptance gained during the initial evaluation period warranted that planning go forward for the design of the Alaska Knowledge Base System protocols. In its final form, the Alaska Knowledge Base System was to provide access to resources covering the entire range of instruction and school administration. This was to be accomplished as follows:

- *PHASE I*
  - Areas Included: literacy, basic skills, and vocational education
  - Storage and Retrieval: manual operation
  - Access: through DOE linkers (Alternative B1 of cost study)
- *PHASE II*
  - Areas Included: additional areas added
  - Storage and Retrieval: computerized
  - Access: through DOE and RRC linkers (Alternative B2)
- *PHASE III*
  - Areas Included: all areas of instruction and administration
  - Storage and Retrieval: computerized
  - Access: through DOE, RRC, and local school linkers (Alternative B3)

In all phases, requests for information and responses to requests could be transmitted via the EMS, letter, or phone.

COORDINATION

Overall coordination of the development and operation of the Knowledge Base System was assigned to the Program Development and Dissemination Unit. Specific responsibilities of the Unit were to include:

- *Development:*
  - establishment of priorities for resources to be included;
  - development of abstracts;
  - development of a temporary manual system of storage and retrieval of Knowledge Base information;
  - development of the computer system for storage and retrieval.

- *Training*
  - training of DOE linkers;
  - training of RRC linkers;
  - coordination of training of local school linkers by the RRCs.
- *Operation*
  - initial manual operation of the Knowledge Base;
  - computer operation of the Knowledge Base;
  - utilization of the ETA EMS for transmission of requests and responses between local schools, RRCs, and the DOE.

STORAGE OF KNOWLEDGE BASE INFORMATION

- Initially, storage was in the form of indexed, written abstracts.
- In later stages, the computer stored the abstracts with a combined, single format used for all resource abstracts.
- Abstracts were indexed by accession numbers and ERIC descriptors.

UPDATING THE KNOWLEDGE BASE

- In the initial manual phase, changes were made directly on the abstracts and indices updated accordingly.
- In the computer phases, changes were made to the abstracts and the files updated.
- Once a year, the Knowledge Base was updated by sending abstracts to sources for verification. Abstracts carried the date of original entry as well as the date of the last revision or verification.

RETRIEVAL

- This was initially performed manually by DOE linking agents.
- When computerized, the same accession numbers and descriptions were used as in the manual approach.
- The computer retrieved entire single abstracts by accession number and all abstract titles or entire abstracts fitting input descriptions – at the user's discretion.

USER SPECIFICATIONS

To ensure that the Knowledge Base System software was developed with simplicity of the user interface as the primary consideration, a detailed set of user specifications was developed and analyzed in depth by the design team. It was decided that the same general data fields would be used for all seven data-file abstracts. However, the nature and name of the data stored in the fields varied among the different types used. Table III-4 shows the nature of the data stored in each field for each type of abstract.

Table III - 4

DATA FIELDS BY ABSTRACT TYPE

Abstract Type	Identification Number	Name	Address and Phone Number	Contact Person	Date	Costs	Abstract	Descriptors	Identifiers	Use Statistic
Service Agency	SAxxxxxx	Agency Name	Address and Phone Number	Contact Person	Date of entry or last verification	Costs	Description	Descriptors	Identifiers	Number of
Talent Bank	TBxxxxxx	Name of Person	Address and Phone Number	Contact Person	Date of entry or last verification	Fees	Description	Descriptors	Identifiers	Number of
Promising Practices	PPxxxxxx	Program Title	Address and Phone Number	Contact Person	Date validated	Costs	Description	Descriptors	Identifiers	Number of
Nationally Validated Programs	NVxxxxxx	Project Name	Address and Phone Number	Contact Person	Date validated	None	Description	Descriptors	Identifiers	Number of
Alaska-Developed Materials	AMxxxxxx	Program Material Title	Address and Phone Number	Contact Person	Date	Costs	Description	Descriptors	Identifiers	Number of
Client Profile	CPxxxxxx	School District Name	Address and Phone Number	Superintendent	Date of entry or last verification	None	Description	Descriptors	Identifiers	Number of
Commercial Resources	CRxxxxxx	Agency Name	Address and Phone Number	Contact Person	Date of entry	Costs	Description	Descriptors	Identifiers	Number of

Data stored also included a standard set of descriptors (same for all abstracts) along with a count of the number of times each descriptor was used and the date the count was started. Standard ERIC descriptors were used.

Data on System utilization were also provided, as shown in Table III-5. For each user, a count was maintained of the type of abstract requested. Whenever statistical data were read out, the date was reset, count fields set to zero, and a new statistical count begun.

DOE had sole responsibility for file maintenance which was performed interactively. Like the user interface, software protocols for

Table III - 5

STATISTICS BY USER DATA FIELDS

Field	Description
User	User ID
Total Uses	Total times the system was used for this user
Service Agency	Number of times SA was used as an identifier for retrieval for this user
Talent Banks	Number of times TB was used as an identifier for retrieval for this user
Promising Practices	Number of times PP was used as an identifier for retrieval for this user
Nationally Validated	Number of times NV was used as an identifier for retrieval for this user
Alaska Developed Materials	Number of times AM was used as an identifier for retrieval for this user
Client Profiles	Number of times CP was used as an identifier for retrieval for this user
Commerical Resources	Number of times CR was used as an identifier for retrieval for this user

maintaining, changing, and adding to data files were very "user friendly." As a result, when the responsible person entered the data base, the software presented detailed help screens to ensure ease and accuracy of operation. Specifically:

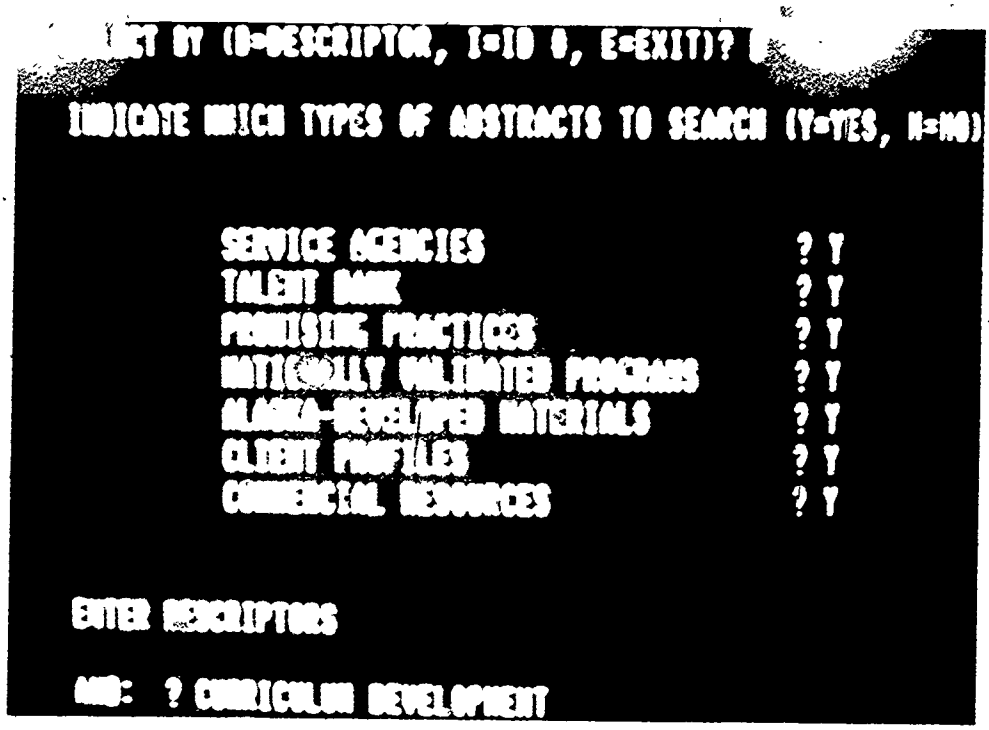
- *Entering abstracts into the file* - The program would:
  - prompt for each item to be entered;
  - check proper form and length of each item entered;
  - check for duplicate ID;
  - check that each descriptor entered was on the standard list;
  - display an error message when data entry was in error; and
  - display data for an abstract after entry so that a check could be made of the entry, then approve, change, or abort as required.
- *Changing abstracts in the file* - The program would:
  - display each element of data in the file, one at a time;
  - allow for leaving "as is" or change each element of data;
  - perform the same error checks on data changed as were performed when data were originally entered; display an error message when data entry was in error;

- allow for skipping remaining data elements when all changes had been made; and
- provide the opportunity, after changes had been entered, to check the changes, then approve or abort.

• *Listing a Single Abstract from File* - The program enabled entering an abstract ID and then displayed the abstract.

• *Deleting an Abstract* - The program would:
- allow entering the ID of the abstract to be deleted;
- list the abstract;
- allow for verification that listed abstract was to be deleted; and
- delete the abstract.

• *Adding and Deleting Descriptors* - The program would:
- allow for entering new descriptors;
- check for duplicate entry when a new descriptor was entered; and
- allow deletion of a descriptor from the file.



The Knowledge Base output to the users was equally helpful and consisted of:

• *Selective Listing of Abstracts* - When selection was made according to descriptors, the program would:
- allow user to enter descriptors with AND, OR, NOT connectors;

- allow user to choose information to be listed for each abstract;
- retrieve and list selected information for all abstracts that matched entered information;
- allow user to list abstracts one at a time or all at once; and
- update use statistics automatically.

- *Selection or a Single Abstract* - This was accomplished by listing the abstract ID.

- *List of Descriptors* - This was available to users when a current list was desired.

PRE-OPERATIONAL NETWORK

In light of the changes made to the EMS, it is worthwhile to review the network operation and to understand the configurations that existed at the different classes of sites: user, nodal, and host.

HOW THE EMS WAS USED

Revisions necessitated by the first evaluation did not affect entry into the System. Originators, who desired searches entered via a trained operator/linker who actually interfaced with the Knowledge Base computer. Upon deciding with the originator what was needed, the linker dialed into the nearest nodal city (access node) and acoustically coupled the micro, via the telephone, to the circuit. Nodal cities were expanded to include Juneau, Anchorage, Fairbanks, and Ketchikan. Each acted as a collection point for data streams containing messages as well as search requests. At the nodal city, the site information was combined with that of other users and was carried by "backbone" communications circuits (high speed data lines) to the host computer in Juneau. By dialing the nodal city, the linker considerably reduced the long-distance charges over dialing directly to Juneau. The cost of transmission via the backbone network from nodal cities to the host computer was paid for by the State since this was shared with other State organizations.

Once connected, the linker received a message from the computer for identification. Upon receipt of an approved ID, the computer allowed access to the Knowledge Base. At this juncture, the linker was given the option to choose the data file of interest. He/she could then retrieve information by entering a series of descriptors or specific abstract numbers. If the search strategy was sufficiently detailed, a limited set of abstracts appeared on the linker's CRT. If the search area contained a large number of available documents, the linker could continue to reduce the list by being more specific as to what was desired. When the list was sufficiently scaled down, the linker could either print the listing on his/her associated printer or store it on a diskette for future processing.

While on-line, the operator could choose to request any messages in the host's storage. The messages could be displayed and read immediately, passed to the printer to obtain hard copies for originators working through that operator, or stored on diskette. The advantage of

using the diskette was, of course, that it enabled the operator to process the received information after the telephone was hung up. If answers were required, or new messages were ready, these could be composed and transmitted immediately, or they could be stored and sent as a batch, thus saving communication costs.

Batched messages (does *not* include searches) received by the host computer were automatically stored to be worked on at some convenient time by the host, usually during off-peak hours. The messages thus processed were then put into the appropriate users' mailboxes for retrieval by operators at some future time.

SITE CONFIGURATIONS

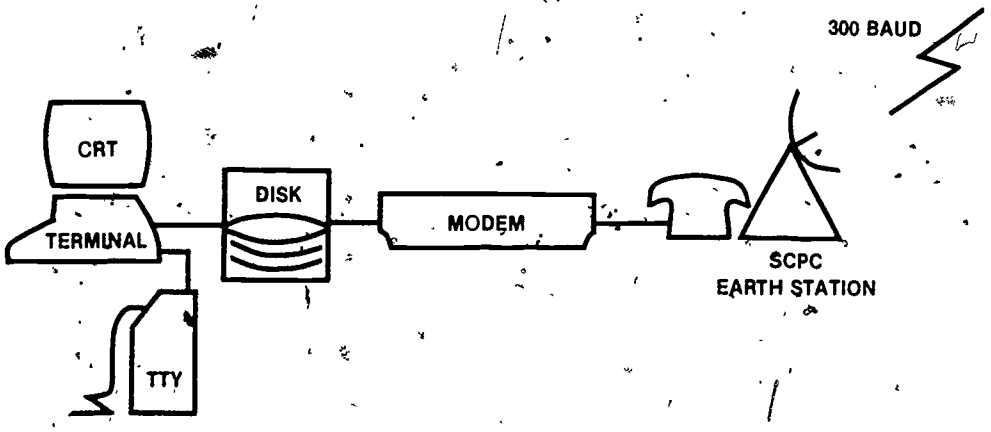
The Network consisted of a varied combination of hardware configured for the particular site and function to be performed plus the transmission medium. Basically different configurations existed at user sites, nodal cities, and the host site.

USER SITE

Two types of user sites are shown schematically in Figures III-2 and III-3. The difference between them lies in the transmission medium used to reach either a nodal city or the host computer site directly. Figure III-2 depicts a micro (terminal), that is connected to a telephone and thence to a satellite earth station operating in the Super High Frequency (SHF) band. Figure III-3 depicts a micro connected to a radio teletype circuit operating in the Very High Frequency (VHF) range. Because VHF is a lower frequency band than SHF, it is more subject to atmospheric disturbances.

Figure III - 2

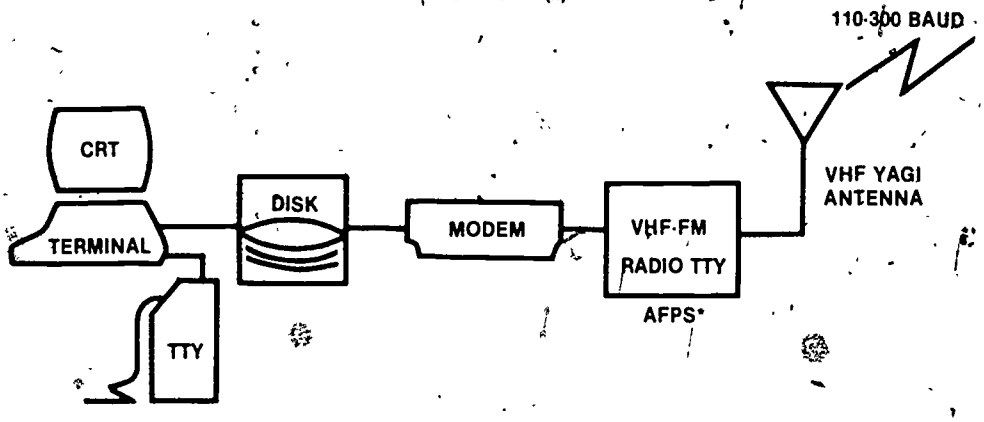
USER SITE (1)



The operator/linker worked directly on the microcomputer via its keyboard. The message could be seen on the CRT and/or teletype (TTY) printer. In off-line operation, the micro was not connected to the telephone or radio TTY. Messages generated were usually stored on the disk shown. When the user wished to send a message, he/she would dial the telephone or, in the second case shown, activate the radio

Figure III - 3

USER SITE (2)



*ALASKA FIXED PUBLIC SERVICE
"BUSH PHONE"

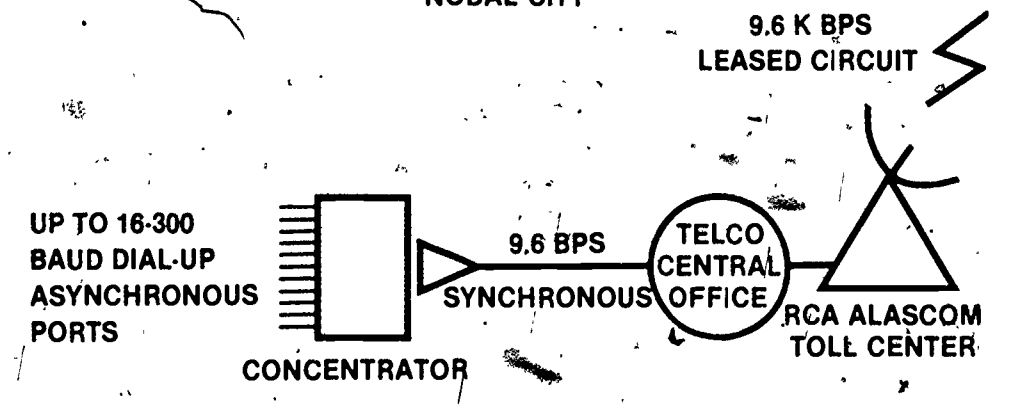
transmitter. When the host computer acknowledged connection, the message(s) were read off the disk into the modem where they were formatted into the proper digital form for use by the concentrator at a nodal city and/or by the host. In on-line operation, the telephone or radio TTY was active during the entire process. On receiving messages, the user could choose to store the information on the disk for processing later or display it directly on the CRT and/or TTY printer.

NODAL CITY

Figure III-4 displays the equipment configuration at a nodal city. The function of this equipment was to collect messages from a variety of users and convert them into a single data stream for more efficient use of the communication circuit capacity available. Thus, incoming messages were fed into the concentrator, a device which generated a single, 9,600-bits-per-second (BPS) data stream from a number of incoming 300 BPS messages. The output of the concentrator could pass through a local telephone company central office, as shown, and thence to a satellite earth station, or it could be routed via a microwave link to the host.

Figure III - 4

NODAL CITY

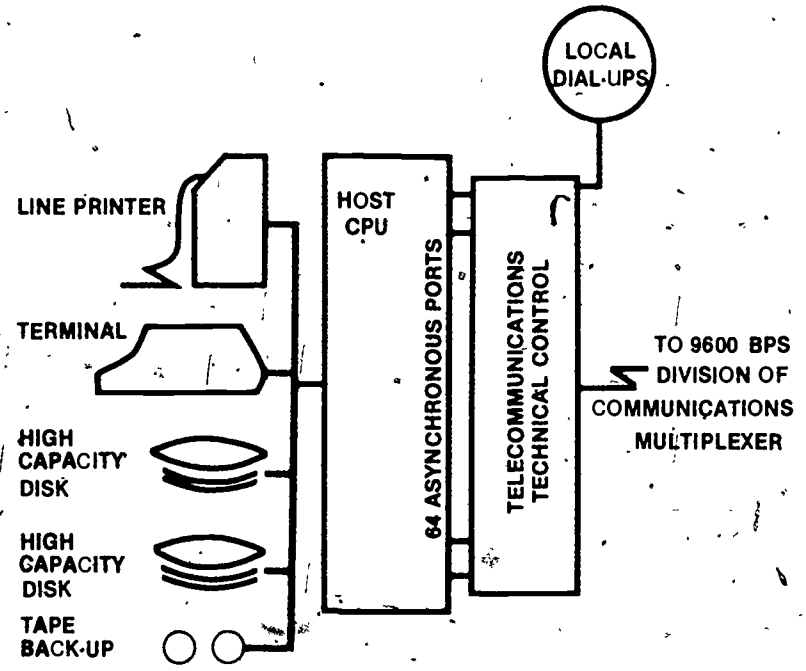


HOST COMPUTER SITE

The host computer site (Figure III-5) could accept inputs in the form of the 9,600-BPS signal from the concentrator and 300 BPS from individual micros simultaneously. The 9,600-BPS signal was broken down into the original messages and fed to ports (entry points) of the computer. Batch information was stored on high-capacity disks for batch processing while interactive users were working on-line in real-time simultaneously. Information addressed to the host or Network monitoring information could be printed out on the line printer. The terminal shown could be used for interfacing with the host computer.

Figure III-5

HOST COMPUTER SITE



The host used in the EMS was made available by the State Division of Data Processing through purchase of a Digital Equipment Corporation PDP-11/70 computer. An EMS Knowledge Base backup was installed in the Department of Transportation Marine Highway System PDP 11/70. The host could support up to 64 simultaneous users.

FORGING THE OPERATIONAL SUPPORT NETWORK

The Exploratory Test conducted in 1978 not only necessitated major hardware and communication network changes but also impacted heavily on local site hardware maintenance requirements. It was obvious that a comprehensive evaluation would be required to ensure that all defects had been overcome and to detect any new ones prior to considering the EMS, and therefore the Alaska Knowledge Base System, operational. This formative evaluation was conducted in April-May, 1979. If all went well, it was intended that a field trial of one year's duration would follow and the System would then be turned over to a DOE operational division and the users.

PILOT TEST EVALUATION

This evaluation was conducted during a time of flux; that is, not all the component parts of the system were in place nor was the EMS software completely debugged. The Project duration and the fixed funding that both NIE and the State had programmed to the end of the Project were the driving forces upon which the timing of this evaluation was predicated. As noted in documenting of the earlier evaluation, it is recommended that the reader take special note of this portion of the report as it will provide important insights into management of the continuing process of innovation introduction.

THE EXISTING ENVIRONMENT

Data for the evaluation were compiled while the EMS was undergoing major changes. Only some of the local computer equipment had been supplied and operator training was only partially completed. Some sites were using portable computer terminals until they received their regular equipment; other sites had no equipment at all. Throughout the evaluation process, equipment was being installed at the local level. Also, host computer equipment and software were undergoing a time of extensive monitoring and some modification.

The communications network was also being tested and modified. As sites began to communicate with the host computer, various problems were discovered. These troubles were recorded. Personnel from the Division of Communications, Department of Transportation and Public Facilities, or Transalaska Data Systems, Inc. (the site equipment provider and maintenance firm) worked to solve them.

EVALUATION PROCESS AND RESULTS

The evaluation was divided into three distinct studies, each with its own set of purposes: (1) Experimental Communications Network study; (2) Postmaster's Troubleshooting Log; and (3) User's Questionnaire.

THE EXPERIMENTAL COMMUNICATIONS NETWORK STUDY:

PURPOSE:

The purposes of this activity were to determine:

- technical quality of the System between the message originator and the host site at Juneau; and
- how the performance of the System was affected by the actions of each support agency and organization.

PROCEDURE:

Pre-recorded floppy diskettes were sent to a number of sites. Messages were 1,400 and 2,800 characters long and contained alphanumeric characters. Each site was asked to transmit the pre-recorded message at specific times on specific days. Each site kept track of how many busy signals and unanticipated disconnects were experienced as well as the length of waiting time required to transmit once on-line. ETA Project staff printed out the test messages as they were transmitted to check for message integrity.

RESULTS:

Overall message accuracy was 96.0 percent. Because of this high degree of accuracy, no further analyses were made to compare reliability by length of message versus time of day or site location. The few less-than-perfect transmissions were caused by:

- Line Hits - noise on the telephone line which causes some garbage characters to be printed in the message; and
- Batch On/Off - at times the host computer tells the local site microcomputer to stop sending because it, the host computer, is busy and cannot receive any more for the moment. Because of the long distances involved, by the time this STOP character reaches the micro, it has already sent some characters that the host cannot handle. Thus, those characters are lost.

As a result, error-correction protocols were installed to correct both faults.

A second set of results was related to the number of retries necessary for EMS operators to transmit the test message successfully. The measured parameters were:

- mean number of busy signals;
- unanticipated disconnects;
- waiting time per-test-message experienced by the sites.

Analyses of variance were carried out to determine if there were significant differences among these variables depending on whether message:

- was long or short;
- was sent in the morning or afternoon;
- originated from Juneau (host site), a nodal city, or a non-node site.

Consistently more problems were experienced during the morning hours than in the afternoon. Although most readers would not have to contend with the four time zones as Alaska does, it is important, initially, to record and analyze traffic loading as a function of time of day. If periods of heavy traffic persist, the Postmaster, or equivalent, should attempt to convince operators to use the slack time periods, taking advantage of the fewer potential problems encountered then.

THE POSTMASTER'S TROUBLESHOOTING LOG

PURPOSE:

The three purposes of this component were to identify problems related to:

- technical quality of the system;
- adequacy of training for users/operators; and
- performance of each agency involved in affecting the System.

PROCEDURE:

A log was maintained by each EMS operator in which was recorded all problems reported by those using that operator.

RESULTS:

A total of 136 problems was noted on the compiled log. Problems were analyzed separately for node sites and non-node sites. Table III-6 shows a clear difference between problems associated with the software and the communications lines for the two types of sites.

Software problems encountered related mostly to the user's mailbox being left in the active state. In this state, the user is not able to access the box and is notified that it is busy. This problem occurs whenever the user becomes disconnected from the host computer or experiences a software error which discontinues EMS processing and automatically takes the user out of the EMS program. This problem was solved by a revision of the software.

Communication-line problems were relatively minor for node sites, but represented almost half the problems for non-node sites. Node sites (nodal cities) were part of the backbone network of specifically tailored circuits called "conditioned lines." The non-node sites had to contend with local circuits (circuits provided within the community, usually by a local carrier) as well as an additional circuit to tie the community to the node site. It was obvious that local circuits and those connecting to the

nodal cities were the major source of trouble. Special attention must be paid to rural line connections, particularly where local telephone companies are concerned.

The small number of operator errors shown in Table III-6 was a good indicator that operator training had been adequate.

Table III - 6

TYPE OF PROBLEM

	Node Site	Non-Node Site
Hardware	14%	15%
Software	62%	34%
Communication Lines	14%	43%
Operator Error	11%	7%

THE USER'S QUESTIONNAIRE

The linkage connection of the EMS terminals to the host differs depending on whether it is located at a nodal site or at a non-nodal site. Therefore, the results were tabulated separately for respondents from one type of site or the other. Since search inquiries were usually transmitted by trained operators/linkers at each district, the responses presented are mostly those from operators and are to questions pertinent to the Knowledge Base System.

When operators were asked *the extent to which busy signals were a problem*, 50 percent of operators from non-node sites and 56 percent from node sites said they were not a problem. Of the remaining operators, 25 percent from non-node sites and 16 percent from node sites indicated that the problem was moderate or slight (25 and 16 percent respectively).

Unanticipated disconnects were considered more of a problem. The extent of the problem was great for 15 percent of operators at non-node sites. This was consistent with earlier findings indicating that local transmission links were noisy. This would be particularly disconcerting for search linkers because, in many instances, disconnects could result in termination of a search procedure with consequent loss of time and effort already expended.

Node-site personnel indicated that the *EMS allowed for sending or receiving information faster than the mail* (90 percent). Seventy percent of the non-node-site personnel indicated that the EMS was faster than mail; 17 percent indicated it was faster than both mail and telephone.

Both the originators and operators were asked *if any improvements were needed to make the EMS better suited to individual needs*. Twenty-one percent of the suggestions received from originators/linkers indicated a need to tie the system directly to the schools where principals and teachers are located. Twenty-five percent of the originator comments suggested that the system be expanded to include links to other places such as other State agencies, libraries, etc.

Of the operators, 62 percent recommended expansion to include more connections or links to other agencies, additional software programs, and more variations in existing programs. Examples of such variations are the ability to underline words and expansion of format to include "TO:," "ATTN:," and "SUBJ:." Another suggestion that was made frequently (23 percent of the comments) was to decrease the response time of the local terminals to the operator's command.

Sixty-two percent of the originators from node sites and 65 percent from non-node sites felt that *they were more in touch with other parts of the State now than before the EMS*. There were 30 percent from node sites and 26 percent from non-node sites who responded that it was "too early to tell." When operators were asked a similar question regarding the other people in their district, 50 percent from node sites and 65 percent from non-node sites indicated, "yes," they thought district staff felt more in touch with other parts of the State as a result of the EMS.

When operators were asked to *indicate which features of the EMS they liked best*, speed of communications and the ease of use received high ratings. Operators from node sites also rated high the feature of message reliability compared to that of mail or telephone. Operators from non-node sites also liked the informality of the system. When

asked to *rate the feature they liked least*, the operators indicated that the system was down too often and that connections were hard to make.

When operators were asked *if the EMS takes more or less preparation time than regular typewritten letters*, 83 percent from node sites and 50 percent from non-node sites indicated that the EMS took less time. There were 35 percent from non-node sites and 17 percent from node sites who felt that it took about the same amount of time; and 15 percent from non-node sites indicated that the EMS took more preparation time.

In response to the query about *the number and types of messages sent*, letters and requests for information represented the most frequent uses in both node and non-node sites, with responses to requests for information close behind. This is not to construe that all the requests to DOE were for data base searches. It is indicative, however, of the need for information. Table III-7 shows how many messages were sent in the weeks prior to responding to the questionnaire.

Table III - 7

How many messages of the following type were sent in the past week?

	(N = 6) Node		(N = 20) Non-Node	
	N	%	N	%
Letter: How Many?	42	33%	55	33%
Announcement: How Many?	25	19%	9	6%
Request for Information: How Many?	32	25%	40	24%
Response to Request for Information: How Many?	25	19%	32	19%
DOE or Other Government Form: How Many?	3	2%	20	12%
Other: What? How many?	2	2%	2	1%

RECOMMENDATIONS

Although only the responses to questions pertinent to accessing the Alaska Knowledge Base System are presented here, the recommendations resulting from the full range of evaluation questions

are of value to readers using or contemplating implementation of electronic mail with a search capability.

- *CONDUCTING BUSINESS*
  - Place EMS microcomputers, wherever possible, on the user premises, thus improving access. Having the micro on-premises could enhance the users' feeling of privacy.
  - Give the users a voice in recommending new system clients.
  - Build commonly used report formats into the system to make it more attractive and useful to users.
- *MESSAGE EFFICIENCY*
  - Monitor message traffic, especially during initial stages, to determine peak periods. Notify users of off-peak hours to ease traffic problems and probably reduce busy signals.
  - Combine word-processing features with the EMS.
- *COST EFFICIENCIES*
  - Encourage imaginative use of site hardware by users. The more it is used, the more cost-effective the system becomes.
  - Pursue an aggressive information dissemination effort to encourage new users to join the system.
- *TRAINING*
  - Provide follow-up training for operators/linkers after the initial training period.
  - Operator/linker practice on micros should not be short-changed during training.
- *SOFTWARE*
  - Continually review procedures/protocols as problems arise to ensure that none is contributing to the problem.
  - Be particularly careful that software protocols minimize or eliminate mailboxes being left in the "active" state after the user disconnects.
  - Ensure that local software is quickly responsive to user commands.
- *PROBLEMS*
  - Use as measures of network performance: busy signals, unanticipated disconnects, waiting time required to transmit once the user is on-line.
  - Monitor closely local communications lines, especially where small local telephone companies are involved.
  - Use the Postmaster's log as a means to identify software as well as hardware problems.

- *SELLING THE SYSTEM*
  - The following positive features can be extolled:
    - ability to send a message to many users simultaneously;
    - speed of communication;
    - gives the user time to reflect on a message before responding;
    - virtue of written communication at the speed of electronic communications;
    - a feeling of being "in touch" with communities of interest for rural users;
    - decrease in time spent in preparing correspondence.
  - In preparing to "sell" the EMS, the following negative features must be recognized and dealt with:
    - No probable decrease in the in-basket load of mail to be answered;
    - possible increase in receipt of unimportant mail because of ease of sending multiple messages;
    - feeling of loss of the personal touch by some users;
    - feeling of guilt about not using the System when it is available by some users.
  - Encourage users in the innovative use of their terminals by providing small grants for purchase of compatible software.

VERIFICATION OF SUCCESSFUL COMPLETION OF THE EXPECTED RESULT

Early in 1978, at the beginning of the Project, a set of standards was developed that, if met, would signify successful accomplishment of the Alaska Knowledge Base System objective. This objective was formulated as the Expected Result: "Using the telecommunications system, teachers and administrators have rapid access to repositories of information about a wide variety of instructional and research documentation, and related materials for administrative decision-making and curriculum improvement."

Associated with the Expected Result were nine Verifiable Indicators (a set of standards) stated in explicit operational terms as well as dates for occurrence of what was to be expected at key points in the System's development. A comparison of the Verifiable Indicators (VIs) and the evidence testifying to their accomplishment is presented:

- *VI-1:* "By 1980, 90 percent of the districts and all RRCs will have the ability to request information through the EMS."

EVIDENCE:

The decision was made early in the ETA Project's life to install microcomputers in *all* 52 districts. By May, 1979, at the start of the EMS Pilot Test, the sites in the Southeast District received their permanent microcomputers and associated equipment. The last two sites to receive micros were Mountain Village School District in October-November, 1980, and the St. Paul site in the Pribilof Islands School District in the spring of 1981.

- *VI-2:* "During 1980, there will be an average of at least one information request per district per month."

EVIDENCE:

Between January and December, 1980, 1,432 searches were instituted. This represents, on the average, more than two searches by each of the 52 districts per month. In those searches, approximately 7,731 abstracts were forwarded to requesters.

- *VI-3:* "By 1980, the Knowledge Base System, consisting of Resource Agencies, Talent Bank, Promising Practices, Nationally Validated Programs, and Commercial Resources, will be in a computer file and will be accessible to DOE personnel through interactive terminals."

EVIDENCE:

- In the summer of 1979, the data files were brought on-line with approximately 450 abstracts of resources and school district profiles.
- By May, 1979, 50 districts had received their permanent micros and associated equipment.

- *VI-4:* "By 1981, the computerized Knowledge Base will be directly accessible to all RRCs as well as the DOE."

EVIDENCE:

By April, 1980, not only was the DOE acting as a linker to the Knowledge Base data files, but so also were the Bristol Bay RRC, South Central RRC, South East RRC, and the Western RRC. In addition, 35 districts had trained linkers at district sites.

- *VI-5:* "During 1981 there will be an average of at least three requests for information per district per month."

EVIDENCE:

During the 1980-1981 school year, the Alaska Knowledge Base was searched approximately 1,300 times; and 14,000 abstracts were printed. This represents just under three searches per district per month over the academic year. It would not be surprising if the number of search requests leveled off or even decreased somewhat as users become more sophisticated, requesting more information per search request.

- *VI-6:* "Access to information about educational resources will be substantially improved (as denoted by user acclaim) by 1981."

  EVIDENCE:

  - During the EMS Pilot Test of 1979, 85 percent of message originators from node sites and 74 percent from non-node sites stated there was an advantage to using the EMS (the technical component of the Alaska Knowledge Base System) in communicating and reporting information.
  - Also in 1979, 92 percent of originators from node sites indicated that the EMS allowed for sending and receiving information faster than by mail. Seventy percent of originators from non-node sites indicated EMS was faster than mail and 17 percent indicated it was faster than mail and telephone.
  - During the academic year of 1980-1981, some 1,300 search requests were forwarded, resulting in approximately 14,000 abstracts.

- *VI-7:* "By 1982, the computerized Alaska Knowledge Base System will be directly accessible to 50 percent of the school districts as well as all RRCs and DOE."

EVIDENCE:

By November, 1980, DOE as well as the four RRCs were acting as linkers for districts to the Knowledge Base. In addition, 43 districts - representing four-fifths of all districts - had trained linkers.

- *VI-8*: "By 1982, 70 percent of the local districts will value the services of the Alaska Knowledge Base System sufficiently to support its continuance." (Since maintenance and upgrading of the data files is the operating responsibility of the Program Development and Dissemination Unit, this VI refers, primarily, to the support network.)

EVIDENCE:

- In FY-1979, local educational agencies provided, as part of their legislative appropriation plus in-kind services, the equivalent of at least 19 percent matching funds to that which the State provided for the ETA Project.
- In July, 1981, ETA Project management officially assigned the EMS site equipment to all 52 school districts via a transfer of title. Along with equipment, school districts accepted responsibility for paying the cost of maintenance, telecommunication costs to access nodes (nodal cities), operator training, and the salaries of the EMS operators/linkers.

- *VI-9*: "The costs associated with the Alaska Knowledge Base System are affordable and accepted by 90 percent of the users by 1982."

EVIDENCE:

In July, 1981, all 52 school district assumed responsibility for the [illegible] equipment. They also assumed responsibilty for paying salaries for trained EMS operators/linkers, cost of training, and equipment maintenance and telephone charges.

In summary, except for Verifiable Indicator #5, all other VIs were met or exceeded - on time or within a shorter time frame - than specified. By virtue of the conditions under which this component of the ETA Project was established, it had met the criteria for operational status.

THE OPERATIONAL ALASKA KNOWLEDGE BASE SYSTEM

Findings of the evaluation of April-May, 1979, showed that the technological supporting network for the computerized Alaska Knowledge Base System was very adequate. In August, a Knowledge Base manager was hired as a full-time employee of the Program Development and Dissemination Unit. This position was and is responsible for maintaining files current, adding new files identified as useful to the educational community, filling searches requested by the districts, and assisting users who have questions or problems.

With the installation of microcomputers in the vast majority (50) of district offices (Mountain Village School District and the Pribilof Islands School District received their computers in 1980 and 1981 respectively) and RRCs, the DOE began to train district personnel in October, 1979, to access the Knowledge Base files directly. Participants were mainly school secretaries already skilled in the use of the EMS and resource persons/librarians. The training consisted of hands-on experience in accessing the Knowledge Base files, search negotiations, descriptor usage, and search strategy.

HOW THE REQUESTER OBTAINS INFORMATION

As of this writing there is one accessing microcomputer per district. It is operated by a person trained in the use of the EMS and in search techniques. This person is called a linker. For a search to be performed, the district linker is contacted. The linker requires certain minimum information to be helpful:

- area of interest (which should be narrowed as much as possible to limit the information to the specific subject of interest; e.g., age of student, grade level, special student characteristics, etc.);
- the person using the information and the purpose, etc.;
- the specific type of information desired, e.g., research ideas, trends, classroom techniques, etc.;
- list of sources the requester has already obtained;
- other useful information.

With this information, the linker will compose the search strategy, dial up the host computer where the Knowledge Base is stored, and interact with the computer to obtain the desired information. This can be retrieved by two techniques: retrieval by ID Number and retrieval by Descriptors.

Retrieval by ID Number results in a printout of specific abstracts. Up to ten abstract numbers can be entered at one time. To restrict information only to that which is desired by the requester, the computer lists all items on the abstract; the user can then elect to see ALL the items or select only certain ones by entering a "Y" (Yes) against them.

Retrieval by Descriptors results in a printout of all abstracts meeting the conditions established by the descriptors. Several may be used at one time to ensure selection, as nearly as possible, of only those abstracts pertinent to the requester. The descriptors can be linked by AND or BUT - a maximum of eight ANDs and two ORs for each AND. "IDENTIFIERS" have been added which relate to specific subjects not listed as descriptors to further assist in the search. (IDENTIFIERS are necessary because the list of descriptors is that of ERIC and therefore not inclusive of all subjects of interest.) As previously, the computer lists all items on the abstract for selection by the linker so that only those germane to the subject are printed out and returned to the requester.

As an aid to the requester, two additional lists are available: a "Region-District List," which provides a list of region codes and the districts located in each region, and the "Descriptor List."

If the user wishes to expand the search for information after having used the Alaska Knowledge Base, or in addition to it, information is available by using the EMS to contact the State Library System. Many of the requests can be filled from the Library's own fiche which are converted to documents and sent to the requesters.

DISTRICT SITE EQUIPMENT CONFIGURATION

The equipment configuration located at the district sites, nodal cities, and host site is basically the same as that discussed in the subsection entitled, "Site Configurations", Page 57. A further breakdown of the district site is shown in Figure III-6. The hardware consists of:

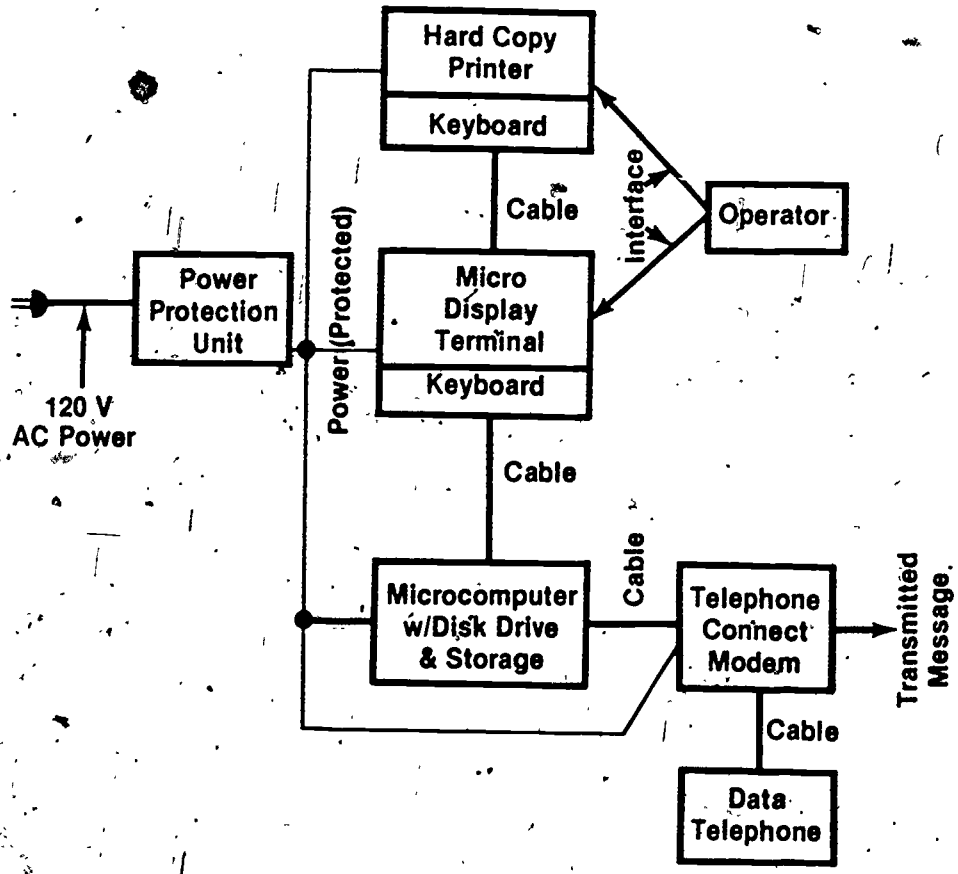
- *TOPAZ POWER FLUCTUATION UNIT* - this unit is the only unit that plugs directly into a wall outlet. All other units connect to it in order to receive regulated power, i.e., power that is protected from fluctuations in the primary power source. Such power fluctuations can damage equipment.
- *BEEHIVE MICRO B-II DISPLAY TERMINAL WITH KEYBOARD* - instructions to the Knowledge Base are entered via the keyboard of this unit. The display device is used to compose and receive messages from the System.
- *GNAT COMPUTER SYSTEM 9 WITH DISK DRIVE AND STORAGE* - this is the heart of the Electronic Mail System. It is the

microcomputer that follows instructions from the operator to compose, transmit, or receive messages. The instructions from the linker must be translated into computer language, however, and this is the purpose of the programs contained on the diskette. In addition, the diskette serves as the storage place for information the operator puts there (e.g., batch messages) or for information sent to the linker from the data base in the PDP 11/70 host computer.

- *DATA TELEPHONE* - this is the telephone supplied by the telephone company. It is used to connect the microcomputer to the transmission network through the modem described below.
- *VADIC MODEL VA-3455 TELEPHONE CONNECT MODEM* - this unit provides the match with the host computer. The signals are re-formatted with error-correcting and other signals necessary to make the MICRO-B understood by the host and to ensure a minimum of mistakes caused by interference in the transmission media.
- *TELETYPE MODEL 43 HARD COPY PRINTER AND KEYBOARD* - this unit can be set by the linker to record searches on paper.

Figure III - 6

DISTRICT CONFIGURATION



STATUS OF THE ALASKA KNOWLEDGE BASE DATA FILES

UPDATE ON THE ORIGINAL DATA FILES

By the end of 1981, the Knowledge Base contained the names of approximately 225 Alaskans in a variety of specialty areas; 150 model programs proven effective in and outside Alaska; 200 aids developed in-state and by nearly 150 commercial sources around the nation; and approximately 175 agencies within and outside the State which help schools solve their problems. Nearly 1,000 abstracts are contained within the data files (1981) as compared to the 450 abstracts that were available when the data files were opened for business in the summer of 1979.

One of the most active files is that of Promising Practices. Activities associated with the file itself and acquisition of resources for it are continually being improved. Since it began in 1976, 34 Promising Practices have been identified; all but nine are still active. Initially, the number may not appear impressive until it is realized that in order to be classified as a Promising Practice, a strict set of criteria must be met. Standards are continually being developed in different areas to expand the usefulness of the data file. The mechanism for developing "criteria" consists of appointing a Task Team made up of specialists, administrators, teachers, and parents from around the State, concentrating on selected areas identified by the educational community as very important. Such task forces are formed when funds are available. The first meeting has always been face-to-face so that members could get to know each other and learn to understand each other's motives and concerns. However, with the introduction of the new audioconferencing network, installed or to be installed in some 240 communities around the State, subsequent meetings could be held via teleconferencing. This would reduce the amount of money required to convene and carry out the work of the task forces. The possibility, as of this writing, is being explored by the Alaska Knowledge Base System manager.

Dissemination of information about Promising Practices was stepped up in 1981 for several reasons: (1) to ensure that educators were aware that such assistance is available; and (2) to stimulate others to submit local practices for review and inclusion in the Knowledge Base. In addition to presenting at the annual "Promising Practices Symposium," additional presentations will be made at State conferences over the year specifically geared to the special interests of attendees at those meetings.

Another change instituted in 1981 was that validation will be for only three years instead of an indeterminate length of time. After three years, staffs will be asked to re-evaluate their programs if they wish to remain listed in the data file.

NEW DATA FILES

MERITS (Many Educational Resource Ideas to Share)

In January, 1982, MERITS was added as another data file to the Knowledge Base. The concept behind the development of this file is to encourage teachers to share successful ideas for classroom projects. To be eligible, the idea must have been put into practice for at least one year, applicants must be prepared to respond to inquiries from other educators, and the applicant must have the superintendent's approval. The latter requirement, like Promising Practices, stems from the fact that MERITS individuals will be called upon to devote time to assisting other schools. Some of this time may have to come from time presently devoted to local school activities.

ALASKA IN-SERVICE INFORMATION/MANAGEMENT (I/M)

This is a new data file presently in the process of being readied for the Knowledge Base. The Elementary and Secondary Education Act Title IV of 1978 mandates each state to "set forth a comprehensive plan which describes the coordination of federal and state funds for training activities for educational personnel in the state including pre-service and in-service training and to provide assurance that the plan is developed with the involvement of teachers, professional associations, institutions of higher education, and other interested individuals and organizations."

Local school districts spent more than $3.5M for staff in-service training during the 1978-1979 school year and more than $4.0M during the 1980-1981 school year in addition to DOE-sponsored training. Statewide in-service coordination should increase the cost effectiveness of training programs. Further, such a data file could be accessed by district personnel through the same micros used for the EMS/Knowledge Base System. This method would replace the existing unreliable "word of mouth" network whereby personnel in one district find out about in-service training available in other districts.

The objectives of the Alaska In-service I/M are:

- to provide accurate and timely in-service coordination information;
- to reduce unnecessary time spent in accumulating and reporting statistical information;
- to improve communication and information flow between the districts and the DOE;
- to centralize record keeping of in-service information and management data; and
- to reduce unnecessary expenditures of time and money on the part of districts and the DOE.

CONCLUDING REMARKS

This document was intentionally written as a history of the Alaska Knowledge Base System. It represents a step-by-step account of the introduction of a technologically supported educational innovation on a large scale. The lessons contained herein have meaning to all educators interested in bringing about a change in traditional patterns. Indeed the lessons learned are of value, not only in rural areas and in education, but anywhere and in any field, where innovation is contemplated. People are reluctant to change unless they can be shown that the change has associated with it rewards commensurate with the "sacrifices" of established norms with which they have grown comfortable.

Throughout this volume, recommendations have been included and put in such a form as to show their value not only in the context in which they were born, but to the many readers who will look to this document for guidance in their own circumstances. It is because the sponsors of this Project, the National Institute of Education and the State of Alaska, wanted a living document, one that can be used by others to provide guideposts along the path to change, that this volume has taken on its present format. The recommendations follow the evaluations that created them. In this way the reader can see what necessitated these changes and relate them to his/her own situation. If the situations are similar, the recommendations have a large measure of validity in their context; if the situations are radically different, the suspect recommendations should be avoided or modified to conform to the reader's needs. In any event, all recommendations act as "flags" identifying for the reader areas to be aware of, even if not directly applicable.

In his presentation, "Introduction of a Successful Educational Innovation - The Educational Telecommunications for Alaska Project (ETA)" at the Rutgers University Conference, "Telecommunications in the Year 2000" (November 19, 1981), Mr. Albert Feiner, former NIE Program Manager, summarized the Alaskan experience into 16 key points that are rules to follow when introducing change (Table III-8). All the "guidelines" are self-explanatory; however, some deserve to be stressed again.

- *Items 2 and 3:*

  It is essential that all involved realize that acceptance of innovation is a personal thing. Until users internalize the value of the innovation, *in their own context,* it will not be utilized. This is not accomplished in the course of one year and may take more than five.

- *Items 8 and 9:*

  Over the past twenty years, *demonstrations of educational technology have,* in the main, *failed to foster institutional*

change. A mechanism must be built in from the beginning to transition the innovation to user support should acceptance be noted and expectations raised. We have found that by building upon the original model, each new addition receives support from those already receiving satisfactory service.

Table III - 8

GUIDELINES FOR A PROJECT DESIGNED TO INTRODUCE INNOVATION

- **Use the technology to enhance the solution of the problem rather than as an opportunity to apply a favored technology.**
- **All involved must make a long-term commitment.**
- **Funding mechanism must be established to at least create a "critical mass."**
- **Be flexible -- be able to adapt to the unanticipated.**
- **Institutionalization begins at the planning stage.**
- **An information dissemination plan must be developed at the very beginning.**
- **Pre-selling of the concepts to those who will be impacted is essential.**
- **The project should be designed as the "nucleus" of the eventual large-scale implementation.**
- **The "nucleus" should be composed of "Enthused Supporters" and represent a microcosm of the full-scale environment.**
- **Uncontrollable variables must be identified to the greatest extent possible.**
- **Evaluation must be built-in as an on-going management decision making tool.**
- **Users must have a meaningful and continuing role.**
- **Plan from the outset the gradual hand-over of responsibility and funding for the operational system.**
- **A training program is key to institutionalization.**
- **Allow users to innovate within their local environment.**
- **Beware of the existing technologies.**

- *Item 11:*

Short, but meaningful, evaluations must be designed from the outset to test critical stages of the innovation introduction. These can be as short as one or two months, but are essential in guiding management. *Do not be afraid to make radical changes if the situation demands it.*

- *Item 14:*

The interface of people with technology, especially those unaccustomed to that interface, is very important. They must be made comfortable in the presence of flashing lights and machines that "talk back." Further, all levels of users must be made to understand what is going on. In the introduction of the EMS, for example, although there were trained operators who actually used the on-site microcomputers, *superintendents and*

administrators were given talks and even took part in the operator training sessions. There were no surprises for them.

- *Item 15:*

Internalization of the usefulness of the technology is essential to acceptance, as mentioned earlier. There is no better way to build strong grassroots support than to allow local personnel to use the technology as it best fills their needs. One of the greatest successes enjoyed by the ETA Project has been the innovative ways school administrators and staff have used the intelligent terminals for their own local uses, e.g., for keeping student files and for financial record keeping. These users are among ETA's strongest supporters.

- *Item 16:*

The technologies introduced in the Project were, in all instances, well-studied and understood. Their strengths and weaknesses were known ahead of time. However, when these technologies must interface with existing and, in many cases, "primitive" ones, BEWARE! It can be unreliable and unregulated local power sources or noisy local telephone loops, etc. that destroy the effectiveness of the system concept. These problems must be resolved *before* monies are spent to install the new technology.

APPENDIX A

SPAN OBJECTIVES

1. "To create and maintain statewide interface mechanisms which facilitate local access to the many services and resources available from the Department of Education and other agencies."

2. "To locate primary operational responsibility in the Regional Resource Centers for face-to-face and/or on-site delivery of the many services and resources available for building local capacity for problem identification and problem solving."

3. "To make the primary purposes of the activities and services of the Educational Program Support Division of the Department of Education:"

   3.1. "The identification and brokering of services and resources of other agencies (rather than by direct provision of services by Department of Education staff to local districts)."

   3.2. "The identification and development of needed resources not elsewhere available."

   3.3. "The improvement of local capacity for problem identification and problem solving."

   3.4. "The evaluation and improvement of the interface mechanism."

4. The strategy for achieving these goals includes:

   4.1. "The design and implementation of a statewide model which brings the many individual agencies, projects and activities together in a way that is complementary and supportive of common goals.

   4.2. "The focusing of in-service training on the preparation of local practitioners to determine needs, develop, implement, and evaluate a district educational plan."

   4.3. "The development, by the district, of an education plan is a first step in the process of accessing services and resources beyond those necessary for the development of the local education plan."

   4.4. "The preparation of personnel in Regional Resource Centers and districts to enhance and develop local capacity and to provide linkage between determined needs and available resources."

   4.5. "The use of Research and Development findings which have identified proven systematic identification, selection, and adaptation process (rather than local development from an untested zero base when Research and Development findings may support another approach)."

   4.6. "The allocation of funds controlled by the Department of Education, wherever possible, to facilitate implementation of this plan."

APPENDIX B

EXAMPLES OF DATA FILES PRINTOUTS

^Q DIVISION OF EDUCATION PROGRAM SUPPORT

SPAN INFORMATION STORAGE AND RETRIEVAL SYSTEM

SEARCH BY : DOE
FOR : DOE
SEARCHER :

DATE: 09-Mar-82
TIME: 10:19

09-Mar-82 SPAN INFORMATION STORAGE AND RETRIEVAL SYSTEM PAGE 1

IDEN NO. : CR000127
TYPE : COMMERCIAL RESOURCE
NAME/TITLE : APPLECART
REGION :
ADDRESS : 515 N. FRANKLIN
JUNEAU, AK 99801
TELEPHONE : (907) 586-3689
CONTACT PERSON : STEVENS, MARTHA
DATE : 12/31/81
FEE: $250.00 PER KIT

DESCRIPTION:
THIS GEOGRAPHY UNIT IS DESIGNED TO STIMULATE INTEREST AND CREATE INVOLVEMENT IN THE STUDY OF ALASKA. AN INTERACTIVE COMPUTER PROGRAM, WHICH SERVES AS AN INTRODUCTION TO THE UNIT, UTILIZES HIGH RESOLUTION GRAPHICS TO REINFORCE FACTS AND CONCEPTS. REPEATED USE OF THE STUDENT'S NAME SUSTAINS INTEREST. THE PROGRAM CONCLUDES WITH A QUIZ. POSITIVE COMMENTS FOLLOW CORRECT ANSWERS AND THE CORRECT ANSWERS ARE GIVEN WHEN STUDENT RESPONSES ARE INCORRECT. CONTENTS OF THE PACKAGE INCLUDE: COMPUTER PROGRAMS, TEACHERS MANUAL, ALASKA GEOGRAPHIC MAGAZINE, STUDENT ACTIVITY CARDS, TRANSPARENT OVERLAY MAPS OF ALASKA, JIGSAW PUZZLE MAP OF THE U.S., U.S. GEOLOGICAL MAP, FORM-A-GLOBES FROM NYSTROM AND AN INFLATABLE VINYL WORLD GLOBE. THE PROGRAM IS DESIGNED FOR THE 4TH GRADE THROUGH ADULTS.

IDENTIFIERS :
DESCRIPTORS: ADULT EDUCATION
COMPUTERS
ELEMENTARY EDUCATION
GEOGRAPHY
LEARNING ACTIVITIES
SECONDARY EDUCATION

IDEN NO. : PP000022
TYPE : PROMISING PRACTICE
NAME/TITLE : FAIRBANKS CERTIFIED STAFF EVALUATION
REGION : IA
ADDRESS : FAIRBANKS SCHOOL DIST.
BOX 1250
FAIRBANKS, AK. 99707
TELEPHONE : (907) 456-7934
CONTACT PERSON : LOWRY, CHUCK/ASST. SUPT.
DATE : 06/05/81
FEE:

DESCRIPTION:
CONTINUOUS REVISION OF THE EVALUATION PROCESS, AND ITS FLEXIBILITY AT THE BUILDING LEVEL ARE KEY COMPONENTS OF FAIRBANKS' CERTIFIED STAFF EVALUATION PROCESS. IT IS BASED ON THE DISTRICT "TEACHER EVALUATION HANDBOOK". DEVELOPED BY A DISTRICT-WIDE EVALUATION COMMITTEE COMPRISED OF 3 TEACHERS, 3 BUILDING ADMINISTRATORS, THE STAFF DEVELOPMENT DIRECTOR AND THE ASST. SUPERINTENDENT. THE HANDBOOK CONTAINS APPROPRIATE JOB DESCRIPTIONS FOR ALL CERTIFIED PERSONNEL AND A COPY OF THE EVALUATION PROCEDURES. ALL CERTIFIED STAFF RECEIVE AN EVALUATION HANDBOOK WITHIN THREE WEEKS AFTER THE BEGINNING OF SCHOOL FOR A GIVEN ACADEMIC YEAR. WITHIN TWO WEEKS OF THE DISTRIBUTION OF THE HANDBOOK, PRINCIPALS, OR OTHER EVALUATORS HOLD AN INSERVICE FOR ALL CERTIFIED PERSONNEL UNDER THEIR SUPERVISION. THE EVALUATION DOCUMENTS PROVIDE AN OBJECTIVE METHOD OF ASSESSING COMPETENCY AND OF IMPROVING PERFORMANCE. EMPHASIS IS ON PROFESSIONAL GROWTH AND IMPROVEMENT TO ENCOURAGE MORE EFFECTIVE TEACHING.

IDENTIFIERS :
DESCRIPTORS: ADMINISTRATION
EVALUATION
STAFF IMPROVEMENT
STANDARDS
TEACHER EVALUATION

IDEN NO. : AK000232
TYPE : ALASKA-DEVELOPED MATERIAL
NAME/TITLE : READING, WRITING AND SMOKED SALMON - GRADES 1-3
REGION :
ADDRESS : SE REGIONAL RESOURCE CTR.
538 WILLOUGHBY
JUNEAU, AK 99801
TELEPHONE :
CONTACT PERSON :
DATE :
FEE: AVAILABLE IN MICROFICHE ONLY. 3MF ' ID# 006 216

DESCRIPTION:
THE GUIDE HAS BEEN ORGANIZED INTO THREE SECTIONS: NUTRITION INFORMATION, CLASSROOM ACTIVITIES, AND AVAILABLE RESOURCES. THE SECTION ON NUTRITION INFORMATION IS INTENDED TO PROVIDE A GENERAL OVERVIEW CONCERNING SPECIFIC ASPECTS OF NUTRITION, WHICH MAY HELP TO CLARIFY AN IMPORTANT NUTRITION CONCEPT WITH WHICH A TEACHER MAY BE INVOLVED DURING THE COURSE OF PREPARING INSTRUCTIONAL UNITS. CLASSROOM ACTIVITIES ARE ORGANIZED INTO FIVE CONCEPTUAL AREAS: "KINDS OF FOODS," "FOOD GROUPS AND NUTRIENTS," "NUTRITION AND HEALTH," "FOOD PEOPLE EAT," AND "FOOD SAFETY AND HANDLING." EACH LESSON WITHIN THE CONCEPTUAL AREAS HAS A SPECIFIC BEHAVIORAL OBJECTIVE AND SUGGESTED ACTIVITIES. THE RESOURCE SECTION INCLUDES A LIST OF FILMS AND VIDEOTAPES ON NUTRITION AND NUTRITION-RELATED TOPICS AVAILABLE FROM THE ALASKA STATE LIBRARY. ADDITIONAL RESOURCES ARE PROVIDED IN THE FORM OF STATE AND NATIONAL ADDRESSES.

IDENTIFIERS :
DESCRIPTORS:
CURRICULUM
CURRICULUM GUIDES
FILMS
HEALTH EDUCATION
HOME ECONOMICS
INSTRUCTIONAL MATERIALS
LEARNING ACTIVITIES
NUTRITION
RESOURCE MATERIALS

IDEN NO. : TB000105
TYPE : TALENT BANK
NAME/TITLE : HOOVER, CAROLYN (HEALTH EDUCATION)
REGION : IA
ADDRESS : FAIRBANKS SCHOOL DISTRICT
TELEPHONE : 465-2841
CONTACT PERSON : TALENT BANK COORDINATOR
DATE : 11/04/81
FEE:

DESCRIPTION:
DR. HOOVER IS THE HEALTH CURRICULUM SPECIALIST FOR THE FAIRBANKS SCHOOLS. SHE OFFERS HER ASSISTANCE IN DESIGNING AND DEVELOPING COMPREHENSIVE SCHOOL HEALTH EDUCATION PROGRAMS. ASSISTANCE INCLUDES: HOW TO BEGIN, PERSONS TO INVOLVE, NEEDS ASSESSMENT, REVIEW OF HEALTH CURRICULA, ADAPTATION TO INDIVIDUAL DISTRICT NEEDS, OBJECTIVE WRITING, SELECTION OF MATERIALS, PILOTING AND IMPLEMENTATION METHODS. OTHER ASSISTANCE PROVIDED IS SCHOOL/COMMUNITY PUBLIC RELATIONS INVOLVED IN TRAINING AND EDUCATING PARENTS ABOUT THE NATURE OF AND NEED FOR SCHOOL HEALTH EDUCATION. TEACHER TRAINING, RESOURCES AND MATERIALS, TROUBLE SHOOTING AND STATISTICAL EVALUATION CAN ALSO BE PROVIDED TO COMMUNITIES. DR. HOOVER PREFERS TO WORK IN OPEN DISCUSSION GROUP SETTINGS IN A COMMON-SHARING DIALOGUE. LENGTH OF CONSULTATION DEPENDS ON COMMUNITY NEEDS.

IDENTIFIERS :
DESCRIPTORS:
ALCOHOL EDUCATION
COMMUNITY ORGANIZATIONS
CURRICULUM
DRUG EDUCATION
ELEMENTARY EDUCATION
GOALS (OBJECTIVES)
HEALTH EDUCATION
NEEDS ASSESSMENT
PUBLIC RELATIONS
RESOURCE MATERIALS
SECONDARY EDUCATION
TEACHING METHODS
TRAINING

IDEN NO. : SA000140
TYPE : SERVICE AGENCY
NAME/TITLE : AMERICAN SCHOOL HEALTH ASSOCIATION (ASHA)
REGION :
ADDRESS : KENT, OHIO 44240
TELEPHONE : (216) 678-1601
CONTACT PERSON :
DATE : 08/28/81
FEE:

DESCRIPTION:
THE AMERICAN SCHOOL HEALTH ASSOCIATION (ASHA) PROVIDES SERVICES TO PROFESSIONALS RESPONSIBLE FOR THE HEALTH OF SCHOOL AGE CHILDREN. ALL MEMBERS OF THE ASSOCIATION RECEIVE ANNUALLY 10 ISSUES OF THE "JOURNAL OF SCHOOL HEALTH." ARTICLES OF INTEREST TO SCHOOL PERSONNEL, OFFICIAL POSITION STATEMENTS AND REPORTS OF THE ASSOCIATION REGULARLY APPEAR IN ISSUE. PUBLICATIONS ALSO AVAILABLE FROM THE ASSOCIATION INCLUDE: SEX EDUCATION, GUIDELINES FOR SCHOOL NURSE, HEALTH INSTRUCTIONS; SUGGESTIONS FOR TEACHERS, GUIDELINES FOR PLANNING SCHOOL HEALTH EDUCATION PROGRAMS K-12 MENTAL HEALTH IN THE CLASSROOM, IN ADDITION TO REPRINTS OF ARTICLES FROM THE "JOURNAL OF SCHOOL HEALTH." MEMBERSHIP IS $30 PER YEAR. PRICE LIST AVAILABLE FOR PUBLICATIONS.

IDENTIFIERS :
DESCRIPTORS: CURRICULUM
CURRICULUM GUIDES
HEALTH EDUCATION
ORGANIZATIONS (GROUPS)
PUBLICATIONS
SEX EDUCATION

IDEN NO. : NV000090
TYPE : NATIONALLY VALIDATED PROGRAM
NAME/TITLE : EARLY PREVENTION OF SCHOOL FAILURE - MIGRANT
REGION :
ADDRESS : PEOTONE, IL 60468
TELEPHONE : (907) 465-2814
CONTACT PERSON : STATE FACILITATOR/AK DEPT. OF EDUCATION
DATE : 04/09/77
FEE: COST VARIES

DESCRIPTION:
THIS PROJECT IS DESIGNED TO PREVENT SCHOOL FAILURE - ADAPTED FOR MIGRANT CHILDREN - THROUGH EARLY IDENTIFICATION AND REMEDIATION OF DEVELOPMENTAL LEARNING DEFICIENCES THAT COULD AFFECT LATER SCHOOL PERFORMANCE. TARGET AUDIENCE 3-6 YEARS OLDS. PROVIDES ACTIVITIES IN GROSS AND FINE MOTOR, VISUAL AND AUDITORY PERCEPTION AND RECEPTIVE AND EXPRESSIVE LANGUAGE. NO SPECIAL FACILITIES ARE REQUIRED. AWARENESS MATERIALS ARE AVAILABLE.

IDENTIFIERS :
DESCRIPTORS: BILINGUAL EDUCATION
EARLY CHILDHOOD EDUCATION
EDUCATIONAL NEEDS
ELEMENTARY EDUCATION
LEARNING DISABILITIES
REMEDIAL INSTRUCTION

LIST OF ILLUSTRATIONS

ABBREVIATIONS

PREFACE

ACS	Alaska Communication System
AEBC	Alaska Educational Broadcasting Commission
AETC	Alaska Educational Telecommunications Consortium
Alascom	RCA Alaska Communications
APBC	Alaska Public Broadcasting Commission
ASOSS	Alaska State-Operated School System
ATS	Advanced Technology Satellite
AVEC	Alaska Village Electric Co-op
BIA	Bureau of Indian Affairs
DHEW	Department of Health, Education and Welfare
DOE	Alaska Department of Education
ERIC	Educational Resources Information Center
ESCD	Education Satellite Communication Demonstration
ETA	Educational Telecommunications for Alaska Project
NASA	National Aeronautics and Space Administration
NEA	National Education Association
NIE	National Institute of Education
OT	Office of Telecommunications in the Governor's Office
RCA	Radio Corporation of America
REAA	Regional Educational Attendance Area
RRC	Regional Resource Center
SPAN	Systematic Planning Around Needs
UNESCO	United Nations Educational, Scientific, and Cultural Organization
WACS	White Alice Communications System

ALASKA KNOWLEDGE BASE SYSTEM

ACS	Alaska Communication System
AEBC	Alaska Educational Broadcasting Commission
AETC	Alaska Educational Telecommunications Consortium
APBC	Alaska Public Broadcasting Commission
ASOSS	Alaska State-Operated School System
A-TIP	Alaska Talent Information and Promising Practices
ATS	Advanced Technology Satellite
AVEC	Alaska Village Electric Co-op
BIA	Bureau of Indian Affairs
BPS	Bits per Second
CRT	Cathode Ray Tube (display screen)
DHEW	Department of Health, Education and Welfare
DOE	Alaska Department of Education

EMS	Electronic Mail System
ESCD	Education Satellite Communication Demonstration
ETA	Educational Telecommunications for Alaska Project
ID	Identification Number
I/M	Information/Management
ITV	Instructional Television
NASA	National Aeronautics and Space Administration
NEA	Alaska National Educational Association
NIE	National Institute of Education
OT	Office of Telecommunications
RCA	Radio Corporation of America
RCA Alascom	RCA Alaska Communications
REAA	Regional Educational Attendance Area
RRC	Regional Resource Center
SDC	System Development Corporation
SERRC	South East Regional Resource Center
SMERC	San Mateo Educational Resource Center
SPAN	Systematic Planning Around Needs
TTY	Teletype
UNESCO	United Nations Educational, Scientific, and Cultural Organization
WACS	White Alice Communications System

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